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ENVIRONMENTAL STUDIES PLAN

Fiscal Year 1990

Offshore Environmental Studies Program

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OCS Report
MMS 89-0050

ENVIRONMENTAL STUDIES PLAN
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Offshore Environmental Studies Program

Prepared by:

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Preface

This document is the final Environmental Studies Plan for the Pacific Outer Continental Shelf (OCS) Region environmental studies program in California, Washington, and Oregon for fiscal year (FY) 1990. Copies are available from the Pacific OCS Regional Office in Los Angeles. This plan considers environmental and socioeconomic issues, questions, and proposed studies related to Federal OCS oil and gas development.

This Environmental Studies Plan will provide a mechanism for implementing the study design for OCS environmental studies that is embodied in the document entitled: "Study Design for Resource Management Decisions: OCS Oil and Gas Development and the Environment" (U.S. Department of Interior, 1978). The studies program is designed to provide the information for decisionmaking and attempts to establish a direct link between those needs and the studies conducted. The design requires identification of OCS management decisions and leads to development of specific studies to aid in making these decisions through the entire Federal OCS oil and gas leasing and development process.

Proposed study topics, which appear in the plan, have come from individuals, agencies, Minerals Management Service (MMS) staff, the Pacific Regional Technical Working Group (RTWG), the National OCS Scientific Committee (SC), and from participants at the MMS sponsored "Conference/Workshop on Recommendations for Studies in Washington and Oregon Relative to Offshore Oil and Gas Development," held in Portland, Oregon, May 23-25, 1988. In addition, contributions to the draft plan were solicited in a May 1988 letter to over 600 organizations and individuals.

Over 70 suggested study titles were received by MMS and are listed in this study plan, but only about one-half of the proposed studies were submitted and adequately described by a required 2- to 3-page study prospectus. All proposed studies, and only those proposed studies, documented by a study prospectus are included herein for funding consideration.

Each study prospectus has been evaluated and ranked by the Pacific OCS Region according to information needs associated with unresolved oil and gas issues, as well as coupled with the timing of projected exploration, development, and production activities. Study rankings reflect agency information needs and priorities for the entire Pacific Coast with regard to oil and gas lease sales and postlease activity. Certain issues require more immediate resolution than others and are ranked accordingly. Although some proposed studies may be given low priority for funding during FY 1990, they may be funded during subsequent years. Indeed, the history of the Environmental Studies Program has shown that many studies that were originally ranked below those actually funded in any given fiscal year, were funded in subsequent years.

This study plan has been reviewed and evaluated by the affected States, local agencies, individuals, the MMS Regional Technical Working Group, and the Scientific Committee. Whether a particular study proposed in the FY 1990 Studies Plan is actually performed depends on a number of criteria yet to be considered, such as the importance of the particular study in relation to other studies submitted by other OCS regions, the scope of the study, and the availability of funds and staff. This plan, therefore, represents a preliminary step towards initiating studies contracts for FY 1990.

Questions regarding this plan or previous study plans can be addressed by contacting Dr. Fred Piltz, Chief of the Environmental Studies Section in the Pacific OCS Regional Office, Minerals Management Service, in Los Angeles (213-894-7120).

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Abstract

This regional environmental study plan describes the proposed Pacific Outer Continental Shelf (OCS) Region, Environmental Studies Program for fiscal year (FY) 1990, including information on past and current studies funded by the Pacific OCS Region. Since 1974 the Pacific OCS Region has funded numerous marine and coastal studies to help provide information for management decisions concerning oil and gas leasing and development on the OCS off California, Washington and Oregon. The proposed FY 1990 study topics are described and are listed according to priority. Study ranking was accomplished using the Department of the Interior's evaluation criteria for OCS Environmental Studies. This plan is being distributed to the interested public, the Pacific Regional Technical Working Group, the Department of the Interior OCS Scientific Committee, and interested State, Federal, and local agencies.

Chapter I. Introduction

A. The Outer Continental Shelf Environmental Studies Program

1. Authority

In 1953, the Outer Continental Shelf (OCS) Lands Act (67 State 462) was passed establishing Federal jurisdiction over the submerged lands of the continental shelf seaward of State boundaries. The Act charges the Secretary of the Interior with responsibility for administering mineral exploration and development on the OCS, as well as conserving natural resources on the shelf. It empowers the Secretary to formulate regulations so that the provisions of the Act may be met and conflicts minimized.

The Submerged Lands Act of 1953 (67 State 29) set the inner limit of authority of the Federal Government by giving the coastal States jurisdiction over the mineral rights in the seabed and subsoil of submerged lands adjacent to their coastline out to a distance of 3 nautical miles. There are two exceptions, Texas and the Gulf Coast of Florida, where jurisdiction extends to 3 marine leagues (approximately 10.35 statute miles) based on colonial charter.

Subsequent to passage of the OCS Lands Act, the Secretary of the Interior designated the Bureau of Land Management (BLM) as the administrative agency for leasing submerged Federal lands and the Geological Survey for supervising development and production. In May 1982, the Secretary of the Interior signed an amendment to Executive Order 3071 that consolidated all Federal OCS minerals leasing and management activities in the newly established Minerals Management Service (MMS). The functions and mission of the OCS Environmental Studies Program, formerly a part of the Bureau of Land Management, are now a part of the Minerals Management Service. As stated in the OCS Lands Act Amendments of 1978 (OCSLAA; Public Law 95372), the major goals for the comprehensive management program for marine minerals are:

> ...to preserve, protect, and develop oil and natural gas resources in the Outer Continental Shelf in a manner which is consistent with the need (A) to make such resources available to meet the Nation's energy needs as rapidly as possible, (B) to balance orderly energy resource development with protection of the human, marine, and coastal environment, (C) to insure the public a fair and equitable return on the resources of the Outer Continental Shelf, and (D) to preserve and maintain free enterprise competition.

In 1969, the National Environmental Policy Act (NEPA) was enacted. This Act requires all Federal agencies to use a systematic, interdisciplinary approach that ensures the integrated use of the natural and social sciences in any planning and decisionmaking that may have a significant impact on the human environment. The MMS prepares comprehensive prelease environmental impact statements (EIS) based upon information compiled during the various phases of the leasing and development process. Since 1973 BLM, and now MMS, have established an OCS Environmental Studies Program to provide an adequate data base upon which sound OCS management decisions can be made.

The 1978 amendments to the OCS Lands Act provide the first legislative mandate for environmental studies in support of offshore minerals development. Title

II, Section 208.20 of this Act requires that studies must be started at least 6 months before the anticipated sale date and that the ultimate goal of the studies program is to provide "information needed for prediction, assessment and management of impacts on the human, marine, and coastal environments of the Outer Continental Shelf, and nearshore areas which may be affected by OCS oil and gas activities in such area or region . . ." (Federal Register 43:3893, January 27, 1978; 30 CFR part 256.82).

2. Studies Program History

The OCS Environmental Studies Program was initiated in 1973 by the Secretary of the Interior through a commitment to perform investigations of certain environmental features of the Gulf of Mexico. From its original budget of $0.5 million, the program has expanded to include the Outer Continental Shelf (OCS) of the entire United States. The program's budget during the past few years has averaged $20 million annually, and overall, the program has funded almost $500 million in environmental studies.

During the program's early phase, baseline or benchmark studies were conducted in each OCS region of leasing interest. These large multidisciplinary studies were designed to provide a statistically valid baseline of the geological, physical, biological, and chemical characteristics of the proposed lease areas. This baseline was to be used to evaluate quantitatively the impacts resulting from OCS oil and gas operations. The benchmark concept was abandoned in 1977 when Departmental decisionmakers determined that the program was not providing timely and appropriate information for leasing decisions and scientists advised the Department that the marine environment was too variable for a statistically valid baseline to be determined in a reasonable length of time. To provide sale-specific information for Departmental decisionmakers in a more timely fashion, the program emphasis was changed from developing baselines to the analysis of specific policy issues and questions related to the OCS oil and gas leasing and development process. The Department was assisted in this change of emphasis by the National Academy of Sciences.

Anticipating the 1978 OCS Lands Act Amendments' requirement to establish procedures for studies implementation, the BLM, in early 1978, commissioned an ad hoc advisory committee of distinguished science policy representatives to prepare a national study design for continued nearshore and onshore environmental studies. Their program plan ("Study Design for Resource Management Decisions: OCS Oil and Gas Development and the Environment") was adopted by the Department of the Interior's OCS Advisory Board on April 29, 1978. Their plan mandates the development of studies based upon the information needs of the OCS minerals management guidelines. A major tenet of the national document is to recognize that each OCS region office is uniquely capable of coordinating with Federal, State, and local agencies and local scientific communities in order to identify regional issues related to OCS minerals development.

Regional issues and national studies goals and perspectives will be described in the forthcoming Environmental Studies Program, Long-Range Studies Plan. Expected to be released in early 1989, the Long-Range Plan will discuss existing knowledge of the effects of OCS oil and gas activities on the environment, what issues have been adequately resolved, what questions and data gaps are thought to exist, and how the Environmental Studies Program can best address the remaining unresolved issues, questions, and information needs.

To help provide continuing scientific guidance and review of the Environmental Studies Program, the Secretary established a National OCS Advisory Board. The board includes a Scientific Committee composed of scientists outside of the Government representing a variety of disciplines concerned with OCS oil and gas development. Additionally, Regional Technical Working Groups (RTWG) were established in each OCS region to provide recommendations and comments on the entire OCS oil and gas leasing and development process, including the Environmental Studies Program.

A recent external MMS review suggests that such guidance has been effective. An evaluation of the Environmental Studies Program was conducted by the Government Accounting Office (GAO, 1988) (1) to determine whether delivery of environmental studies reports was timely in relation to originally scheduled due dates and planned lease uses, (2) to identify user satisfaction with the studies and how the MMS used the studies for making decisions and (3) determine whether the Alaska program resources could be used more efficiently. The GAO report concluded (page 3) that "in general, both MMS and non-MMS users of program studies were satisfied with the usefulness, timeliness, and quality of the program studies."

3. Studies Program Goals and Objectives

As prescribed by the 1978 OCS Lands Act Amendments, the purpose of the OCS Environmental Studies program is to

a) enhance the leasing decision process by providing information on the status of the environment upon which the prediction of the impacts of Outer Continental Shelf oil and gas development may be based;

b) provide information on the ways and extent that Outer Continental Shelf development can potentially impact the human, marine, biological, and coastal areas;

c) ensure that information already available or being collected under the program is in a form that can be used in making decisions associated with a specific leasing action or with the longer term Outer Continental Shelf minerals management responsibilities; and

d) provide a basis for future monitoring of Outer Continental Shelf operations.

In July 1987, the Secretary of the Interior announced a 5-year OCS lease sale schedule (U.S. Department of the Interior, 1987a) for the period from 1987 through June 1992 (see table 2 in chapter II). The proposed schedule shows one sale every 3 years instead of one sale offered every other year for areas outside the Gulf of Mexico region.

Changes in the studies program that support this lease schedule include (1) greater balance between prelease sale and postlease sale studies, (2) greater emphasis on generic studies, (3) development of a strategy for post-lease sale monitoring studies, and (4) possible funding of studies previously supported by other agencies.

B. Regional Studies Planning

1. Issue Identification

The major steps for making decisions for Federal OCS minerals development, from issuing the Call for Information through lease expiration or termination, are listed in figure 1 and are fully described in the most recent 5-year OCS lease sale schedule (U.S. Department of the Interior, 1987a).

The OCS studies program recognizes two general issue categories related to Federal OCS minerals development in a given area, and to national and regional issues. National issues concern more than one OCS region and may recur several times in the decisionmaking process. The regional issues treated in this plan relate to Federal OCS minerals development offshore California, Washington, and Oregon.

Some examples of national issues include effects of oil on aquatic ecosystems, impacts of oil production on deep water environments, and modeling of socioeconomic and environmental impacts. Study topics developed from these national issues are designed and administered by either the Branch of Environmental Studies, Headquarters Office or the designated regional OCS offices with the assistance of the other regional offices.

Issues, and the subsequent studies proposed to resolve these issues, can be identified in a number of ways. The various OCS advisory groups, Government agencies, private companies or organizations, or private individuals may provide this region with information regarding issues they feel should be studied by MMS. The majority of the issues are identified from within MMS.

2. Translate Issues into Decisionmaker's Questions

Once issues are identified, the second step of the process is to translate each issue into questions based on information needs at various steps in the OCS decisionmaking process. As stated in the National Study Design, there is a continuum of three levels of information needs related to the decision hierarchy. At one level policymakers are required to recognize those issues that could affect goals, policies, or programmatic schedules. At another level, policymakers must consider highly technical or scientific questions of impact. Between the two lie issues and questions relating to midlevel management or the local application of priority policies. There is no definable break between levels, and all three levels of information could be presented in the same issue. In general, however, the levels are related to policy development, policy implementation, and information collection.

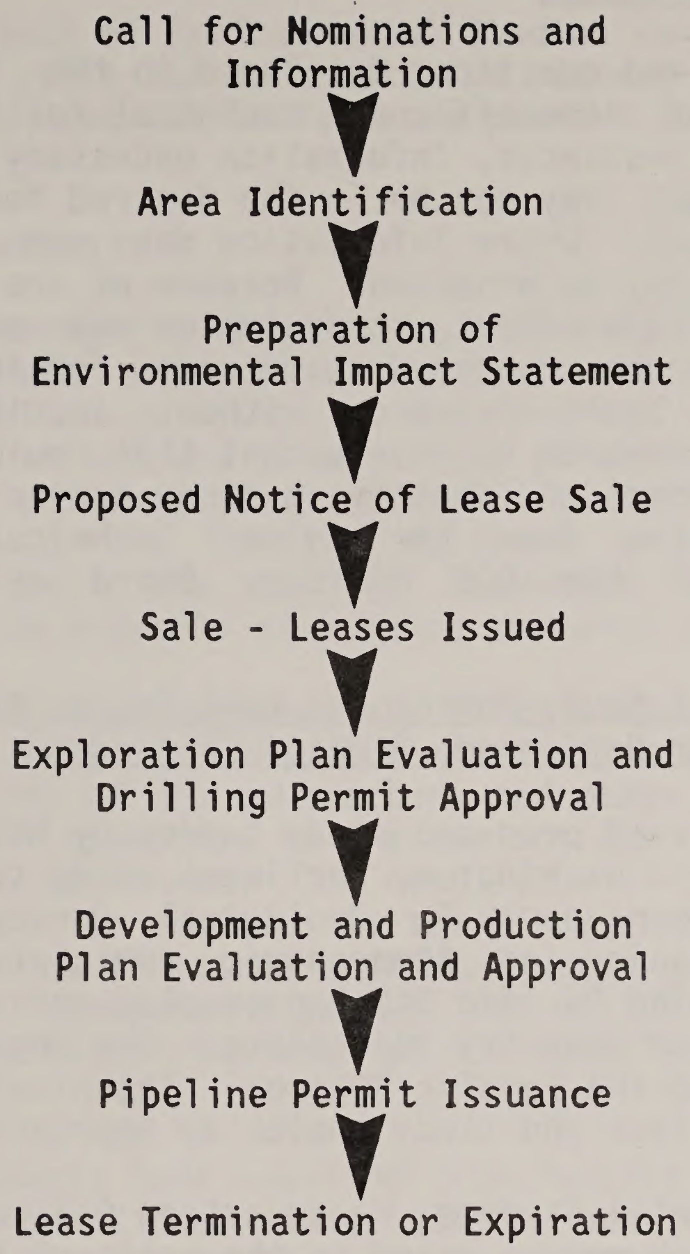
Call for Nominations and Information
Area Identification
Preparation of Environmental Impact Statement
Proposed Notice of Lease Sale
Sale - Leases Issued
Exploration Plan Evaluation and Drilling Permit Approval
Development and Production Plan Evaluation and Approval
Pipeline Permit Issuance
Lease Termination or Expiration

Figure 1. Steps in the OCS decisionmaking process.

3. Identify Study Topics

The significant issues and questions developed in the first steps are next evaluated in terms of scientific and technical feasibility and information availability. In some instances, information necessary to address an issue may already exist, but may not be in the desired format, or may need to be summarized or interpreted. Where information does not exist to address an issue, a study topic may be proposed. Because of the requirement for direct applicability of each study effort, study topics are evaluated in terms of scientific merit and the required timeframe for information needs. This evaluation eliminates basic research without specific application and nonessential applied research or development that could not be completed in a timely manner. The process of identifying study topics by the MMS staff is augmented by information from the Regional Technical Working Group and the Scientific Committee of the OCS Advisory Board as well as from other interested parties.

4. Review Regional Study Topics and Rank Topics According to Department of the Interior Nationwide Studies Criteria

After preliminary review of proposed study topics by MMS scientists in the OCS regional offices and in Washington, pertinent study topics are circulated to other Federal science agencies (U.S. Geological Survey, Fish and Wildlife Service, National Oceanic and Atmospheric Administration, Navy, etc.) for critical evaluations. The Pacific OCS Region also actively solicits reviews by academic, State, and industry scientists. The Department of Interior OCS Scientific Committee and the Pacific Regional Technical Working Group also review regional study plans and study topics as appropriate.

The Branch of Environmental Studies, Headquarters Office compiles the proposed studies topics from each region based on the national studies criteria listed in appendix A. This process results in a national studies list of proposed MMS study topics for a given fiscal year that will be used for MMS's annual research appropriation in the Federal budget process.

C. Studies Program Procurement

All funds administered by the MMS in the OCS studies program are allocated through a rigorous justification sequence following the guidelines of the Federal and Interior Procurement Regulations. Also, most of the OCS environmental studies are procured as competitive procurements. After a Statement of Work (definition of study objectives, methods and schedule) is developed, a Request for Proposals (RFP) is issued by the Branch of Procurement Operations inviting technical/cost proposals. Submission requirements are detailed in each RFP. All proposals are reviewed by a select panel of Federal scientists in accordance with a list of evaluation criteria published in the RFP.

Efficient procurement planning is a critical part of an effective studies program for MMS. There is a lengthy time period from identification of study topics for a given OCS region, to funding approval from Headquarters, to study development, to outside and headquarters review, to procuring the contract, and finally to obtaining the study results. Development and review of the study work statement and procurement package in the field can take up to 2 months; headquarters Branch of Environmental Studies review can take several weeks; the procurement cycle for a competitive request for proposals can take up to 4 or 5 months; and contract performance periods can be from 1 year to several years.

D. OCS Studies Coordination

The Pacific OCS Region recognizes that a considerable amount of study and research on the OCS and coastal environments has been conducted and will continue to be conducted by others. Therefore, synthesis and use of information already obtained are given a high priority. The studies program will continue to locate and evaluate pertinent information gathered by others that can be applied to the leasing decision process. The goal of this approach is to make the best use of the knowledge already collected and thereby avoid duplicating previous or ongoing research efforts.

The Pacific OCS Region Office sponsored its first Information Transfer Meeting (ITM) December 11-13, 1984, in Santa Barbara, California. This was a public meeting with presentations by MMS contractors and other researchers. To date, three ITM's have been conducted in the region, and it is planned that they will be held every 12 to 18 months. The next ITM will be held May 31 - June 1, 1989 in Santa Barbara. In addition to the ITM's, MMS held a conference and workshop on recommendations for studies in Washington and Oregon relative to offshore oil and gas development in May 1988 in Portland, Oregon. Similar meetings were held in 1975-1976 for each of the Pacific OCS Region Planning Areas.

An extensive list of reports have resulted from Pacific OCS Region contracted studies. Contract information, study titles, and report availability have been summarized in the "Environmental Studies Contract and Report Index" (projected availability, August 1989), which can be obtained from the Pacific OCS Region. Many MMS reports and publications are available from depository libraries (appendix C), located along the Pacific coast. The depository libraries increase public access to documents that otherwise would have to be purchased from the National Technical Information Service.

The Department of the Interior OCS Scientific Committee has been active in providing general direction for the OCS Environmental Studies Program. The Pacific OCS Region participates on a regular basis in the committee's meetings and working group sessions for various discipline topics. Members of the OCS Scientific Committee also participate in workshops sponsored by the Pacific Office. The latest Scientific Advisory Committee meeting was held in Reston, Virginia during February 1989.

The MMS has also been active in seeking and funding reviews of portions of its programs by the National Academy of Sciences (NAS) National Research Council. The MMS is presently participating in or being reviewed in the subject areas of marine environmental monitoring, physical oceanography, marine ecology, endangered species, and social economic studies. Past review efforts involving MMS as participant and funding source include the NAS review of "Drilling Discharges in the Marine Environment" (1983) and "Oil in the Sea" (1985).

E. OCS Technology Assessment and Research Program

The MMS funds another study program, the Technology Assessment and Research Branch (TA&R) technical studies program. The TA&R assesses research and development conducted by industry, universities, and Government institutions and contracts for studies that are considered to offer further assurances for improving safety and preventing pollution on the OCS. These studies comprise a coordinated research effort that has concentrated upon generic studies in structural dynamics, blowout prevention, oil-spill cleanup and operational consequences upon the environment.

Chapter II. OCS Leasing and Development Activities in California, Washington, and Oregon

A. Offshore Development Activities

1. Southern California Planning Area

Eight lease sales and one reofferring sale have been held in Federal waters in what is now the Southern California Planning Area (fig. 2). The Southern California Planning Area encompasses all currently producing areas within the Pacific OCS Region. A total of 320 exploratory wells and 661 development wells have been drilled through August 1, 1988 (table 1). Twenty platforms have been installed and five others have been approved for installation. One exploratory well was drilled and five development wells were completed in the Santa Maria Basin and the Santa Barbara Channel during 1988. Proposed lease sales (U.S. Department of the Interior, 1987b) within the Southern California Planning Area include Sales 95 (January 1990) and 138 (June 1992), (Table 2). However, due to President Bush's statement to Congress in February 1989, California OCS lease sales will be reviewed by a Presidential OCS Task Force over the next year. Therefore, these proposed schedules are uncertain at this time.

2. Central California Planning Area

Activities in the Central California Planning Area began in 1963 when the first Federal OCS oil and gas lease sale resulted in the acceptance of bids for 24 tracts in the area offshore San Francisco. Twelve exploratory wells were drilled, but no development occurred and all leases were relinquished by 1968. The 5-year leasing program (U.S. Department of the Interior, 1987a) calls for a single lease sale (119) in the Central California Planning Area in March 1991. However, this proposed sale could be subject to President Bush's OCS Task Force over the next year.

3. Northern California Planning Area

Within the Northern California Planning Area, 17 tracts were leased in the Eureka area and 10 in the Point Arena area during the 1963 lease sale. A total of eight exploratory wells were drilled, but all leases expired during 1968 without any production taking place. The 5-year leasing program (U.S. Department of the Interior, 1987b) calls for two lease sales in the Northern California Planning Area, including 91 (February 1989) and 128 (February 1992). However, proposed lease sale 91 has been delayed by Congressional action to no earlier than October 1989. Proposed Sale 91 will be reviewed by President Bush's OCS Task Force during the next year. According to President Bush, the sale is now indefinitely postponed.

4. Washington-Oregon Planning Area

Following the second Pacific OCS lease sale, which was held in 1964, 101 leases were issued and 12 exploratory wells were drilled in what is now the Washington-Oregon Planning Area (fig. 2). No development occurred and all leases were relinquished by 1969. Sale 132 is proposed for April 1992 (U.S. Department of Interior, 1987b).

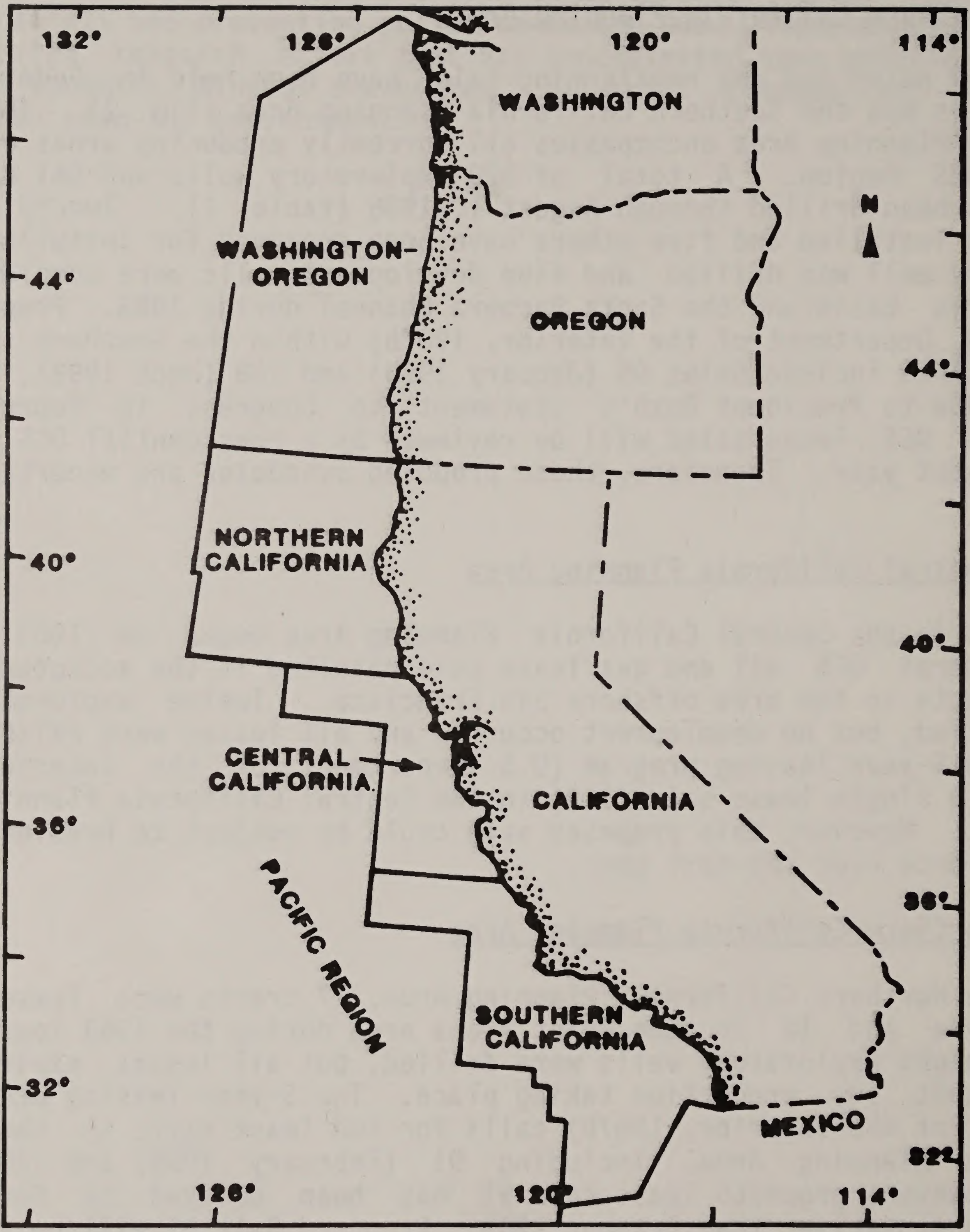

Figure 2. Pacific OCS Region Planning Areas

Table 1. Pacific OCS Region oil and gas leasing, exploration, and development statistics*

	Leases									
Sale	Nominated	Offered	Bid On	Leased	Terminated	Active	Wells Drilled Expl.	Wells Drilled Develop.	Existing** Platforms	Platforms Approved Not Installed
1963 P1	174	129	58	57	57	0	20	0	0	0
1964 P2	650	196	101	101	101	0	12	0	0	0
1966 P3	NA	1	1	1	0	1	6	93	2	0
1968 P4	150	110	75	71	37	34	142	405	12	3
No. 35	1,350	231	70	56	52	4	41	131	3	0
No. 48	970	148	55	54	41	13	32	33	2	0
No. 53	1,743	111	81	60***	22	38	55	23	2	2
No. 68	609	140	35	29	14	15	16	0	0	0
No. RS-2	N/A	27	12	10	8	2	1	0	0	0
No. 73	2,800	137	8	8	4	4	0	0	0	0
No. 80	1,765	657	25	23	4	19	0	0	0	0
	10,211	1,887	521	470	340	130	325	685	21	4

*Sources: Minerals Management Service, Pacific OCS Region, Office of Field Operations - 6/29/89

**Does not include one Offshore Storage and Treatment Facility, and Platform Elly which is for processing only.

***Twelve leases were forfeited.

Table 2. U.S. Department of the Interior 5-Year oil and gas leasing program

APRIL 1988

SALE	SALE DATE	1987						1988												1989												1990												1991												1992					
		J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J
112 W. GULF OF MEXICO	8/87				HELD			8/12/87																																																					
97 BEAUFORT SEA	3/88				HELD			3/16/88																																																					
113 C. GULF OF MEXICO	3/88				HELD			3/30/88																																																				
109 CHUKCHI SEA	5/88				F		P		G		N	S																																																	
115 W. GULF OF MEXICO	8/88				F					P		G		N	S																																												
116 E. GULF OF MEXICO	11/88				F							P		G			N	S																																									
91 N. CALIFORNIA	2/89						E		H						F	P		G		N	S																																								
98 N. ATLANTIC	2/89								E	H					F	P		G		N	S																																								
118 C. GULF OF MEXICO	3/89	D	A							E	H				F	P		G		N		S																																							
122 W.GULF OF MEXICO	8/89	D	A							E	H				F						P		G		N		S																																		
SU1 SUPPLEMENTAL	9/89																		C	D			I	P		G	N	S																																	
107 NAVARIN BASIN	12/89																E	H						F		P		G		N	S																														
●121 MID-ATLANTIC	12/89			C	D			A										E	H					F		P		G		N	S																														
95 S. CALIFORNIA	1/90	C	D	A														E	H							F	P		G		N	S																													
●101 ST GEORGE BASIN	2/90				C	D		A													E	H					F	P		G		N	S																												
123 C. GULF OF MEXICO	3/90											C	D		A							E	H				F	P		G		N		S																											
125 W. GULF OF MEXICO	8/90											C	D		A							E	H				F						P		G		N		S																						
●114 GOA/COOK INLET	9/90							R				C	D		A													E	H				F		P		G		N	S																					
SU2 SUPPLEMENTAL	9/90																														C	D			I	P		G	N	S																					
117 N. ALEUTIAN BASIN	10/90											C		D	A												E	H						F		P		G		N	S																				
●108 S. ATLANTIC	10/90											R				C	D		A									E	H					F		P		G		N	S																				
124 BEAUFORT SEA	2/91															C	D		A													E	H						F	P		G		N	S																
119 C. CALIFORNIA	3/91																	C	D		A											E	H						F		P		G		N	S															
131 C. GULF OF MEXICO	3/91																							C	D		A							E	H				F	P		G		N		S															
126 CHUKCHI SEA	5/91																			C	D		A													E	H					F	P		G		N	S													
136 W. GULF OF MEXICO	8/91																							C	D		A							E	H				F						P		G		N		S										
SU3 SUPPLEMENTAL	9/91																																										C	D			I	P		G	N	S									
●120 NORTON BASIN	9/91																			R				C	D		A												E	H						F	P		G		N	S									
137 E. GULF OF MEXICO	11/91																							C	D		A							E	H				F									P		G		N		S							
●129 SHUMAGIN	1/92																							R				C	D		A													E	H					F	P		G		N	S					
●134 N. ATLANTIC	2/92																											R				C	D		A									E	H					F		P		G		N	S				
128 N. CALIFORNIA	2/92																															C	D		A									E	H					F		P		G		N	S				
139 C. GULF OF MEXICO	3/92																																			C	D		A							E	H				F	P		G		N		S			
●132 WASHINGTON-OREGON	4/92																													R				C	D		A									E	H					F		P		G		N	S		
●133 HOPE BASIN	5/92																											R				C	D		A													E	H					F	P		G		N	S	
138 S. CALIFORNIA	6/92																																			C	D		A									E	H					F		P		G		N	S
●130 NAVARIN BASIN	6/92																												R				C	D	A												E	H						F		P	G			N	S
●140 STRAITS OF FLORIDA		CANCELED SUBJECT TO 3/88 DOI /FLORIDA AGREEMENT																																																											

● Frontier Exploration Sale. Request for interest will be issued if necessary.

R - Possible Request for Interest C - Call for Information & Nominations D - Comments on Call Due A - Area Identification E - Draft EIS H - Public Hearing F - Final EIS

I - Issue Environmental Assessment for Supplemental Sale P - Proposed Notice of Sale G - Governor's Comments Due N - Notice of Sale S - Sale

Detailed historical aspects of the OCS oil and gas development are reviewed and summarized in the Pacific Summary Report/Index June 1, 1986 - July 31, 1987 (MMS 87-0078). Table 1 summarizes current Pacific OCS oil and gas leasing, exploration, and development statistics as of August 1988. Descriptions of the most recent leasing and development activities and their potential environmental effects for the Southern California Planning Area are found in the final EIS for Sale 80, released in December 1983 and for Northern California Sale 91 draft EIS in December 1987. For the Central California Planning Area, the reader may consult the final EIS for Sale 53, released in September 1980. In addition, the final EIS for the 5-year program (1987-1992) approved in July 1987 contains information on all Pacific OCS Region Planning Areas. The leasing schedule for the 5-year OCS oil and gas program in the Pacific OCS Region is shown in table 2.

B. Leasing and Coordination Activities of the Minerals Management Service

Responsibilities of the MMS include a broad spectrum of management and coordination activities relating to the OCS leasing and development process (The MMS Pacific Summary/Index: June 1, 1986-July 531, 1987). The OCS Advisory Board was established during 1975 to provide the Department of Interior (DOI) with a formal mechanism to receive comments and recommendations from coastal State officials and to provide a forum for effective dialog among agencies involved in OCS development. In its current form, the OCS Advisory Board is composed of three elements: the Policy Committee, the Scientific Committee, and six Regional Technical Working Groups (RTWG). The Advisory Board's three-tiered structure provides for specialized considerations of the policy, scientific, and technical aspects of OCS leasing programs and balances State, local, Federal, public, and private interests.

1. Policy Committee

The Policy Committee reports to the Interior Secretary through the MMS Directory. Participating committee members are listed in Pacific Summary/Index: June 1, 1986-July 31, 1987.

2. Scientific Committee

The Scientific Committee is composed of 15 scientists from disciplines important to MMS's Environmental Studies Program. The committee reports directly to the MMS Director and advises on the appropriateness, feasibility, and scientific value of the Environmental Studies Program and particularly the yearly Environmental Studies Plans from the regional offices. A list of Scientific Committee members are listed in Pacific Summary/Index: June 1, 1986-July 31, 1987.

3. Regional Technical Working Groups

Each RTWG Committee is composed of representatives of the affected States, the Minerals Management Service, the Fish and Wildlife Service, the U.S. Coast Guard, the Environmental Protection Agency, the National Oceanic and Atmospheric Administration, the oil and gas industry, and other special and private interests from each leasing region. The Pacific RTWG has State representatives from California, Washington and Oregon; members are listed in Pacific Summary/Index: June 1, 1986-July 31, 1987. Every RTWG Committee is cochaired by the MMS Regional Director or designee and a State representative, who is elected by all the state representatives in the group. This membership enables a number of parties with responsibilities and interests in OCS oil and gas activities in each region to provide technical information to the regional MMS office and to one another on technologies, conflicts and conflict resolution, and studies and planning efforts affecting or affected by OCS activities.

The RTWG Committee meets periodically to discuss issues pertaining to existing leases, future leasing activity, and the transportation of hydrocarbons from the OCS. These meetings are open to the public, and oral statements by interested parties are permitted. The meetings and agenda are announced in the Federal Register before the meeting. Summary minutes of the meetings are available for distribution 30 days following the meeting from the MMS Pacific OCS Regional Office in Los Angeles. Detailed proceedings of the meetings are available from the same office.

4. Pacific Northwest OCS Task Force

The Pacific Northwest OCS Task Force was established in January 1989 to provide a means for Federal, State, tribal, and other public and private representatives to participate in the OCS oil and gas program in the Washington-Oregon Planning Area. The Task Force will meet twice a year to address environmental studies planning and implementation, lease sale area identification, lease sale timing, and environmental impact statement preparation.

Chapter III. Pacific OCS Region Studies Objectives, Strategies and Activities

A. The Environmental Studies Program

The Environmental Studies Program (ESP) of the Pacific OCS Region encompasses seven broad study disciplines. These topics include air quality; physical oceanography and meteorology; fates, effects and chemistry; biology and ecology; marine mammals, seabirds and endangered species; social and economic; and program support. Figures 3a and 3b show relative historic (cumulative) funding levels and active funding levels, respectively, for each of the major disciplines.

The MMS Headquarters Office initiated a Peer Review Project in 1982 with the objectives of providing more support for the review, publication, and dissemination of OCS environmental studies results. These objectives are being accomplished by funding the publication of ESP contract results in critically reviewed scientific journals. Contracts have also been awarded for the interpretation and synthesis of the results of previous studies and their publication in critically reviewed journals. The Pacific OCS Region Studies Program now allocates funds in studies contracts to support publication, to hold scientific workshops, and to present results at scientific meetings.

The Environmental Studies Chiefs and Regional Supervisors for Leasing and Environment modified the system of prioritizing proposed new studies submitted from all MMS regions in FY 1986 (appendix A). Proposed new studies on the National Studies List are evaluated under Criterion A, on the basis of the study's support to specific leasing or management decisions and whether the work is mandated by law or is a Federal or State requirement. Studies may be ranked from A1 through A4, depending on how critical or useful the information is. Under Criterion B, a study is ranked B1 through B3 depending on required expediency and the risk involved by deferring the study. Continuation studies are not ranked by this system because of MMS contractual obligations for ongoing efforts. These studies are ranked first for incremental funding and are reviewed periodically for continued usefulness and timeliness.

B. Washington-Oregon Frontier Area Studies

The Washington-Oregon Planning Area represents a frontier region for potential oil and gas leasing and development. Washington-Oregon Sale 132 is scheduled for April 1992, and the ESP recognizes its mandate under Section 20 of the OCS Lands Act to conduct environmental investigations of the area in a timely manner. To these ends, MMS accelerated and initiated several studies dealing with Washington-Oregon prelease issues during FY 1987 and FY 1988 and additional studies are planned for FY 1989 and FY 1990. Information needs were addressed by the MMS sponsored May 1988 meeting in Portland, Oregon, entitled "Conference/Workshop on Recommendations for Studies in Washington and Oregon Relative to Offshore Oil and Gas Development." The present plan includes several studies that were recommended by workshop participants. A proceedings report of the conference is available from the Pacific OCS Region.

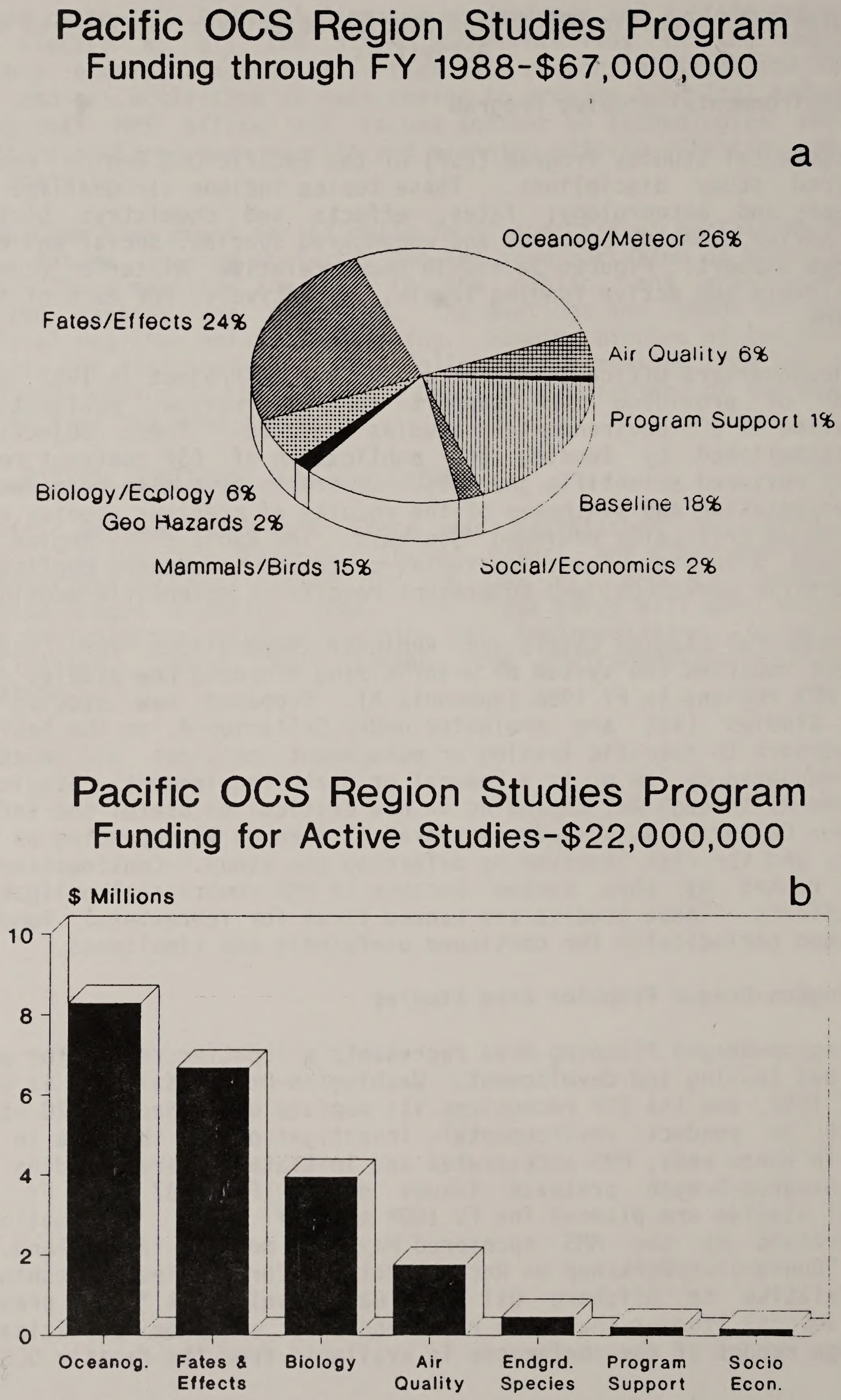

Figure 3. Pacific OCS Environmental Studies Program (a) relative cumulative funding levels and (b) current (FY 1988) funding levels by discipline.

The Pacific OCS Region continues to coordinate with technical advisory groups and Indian tribes from Washington and Oregon. The MMS Scientific Advisory Committee, meeting in Seattle during July 1988, were addressed by State representatives, Indian tribes and environmental groups, who expressed their concerns and recommendations. Following a recommendation from the Governors of Washington and Oregon, a Pacific Northwest OCS Task Force was initiated in January 1989 to ensure ongoing interaction and coordination between the Pacific OCS Region's Environmental Studies Program and the States.

Studies now in progress or procurement that deal specifically with the Washington-Oregon Planning Area include the following:

1) Operation of West Coast Meteorological Buoy Network
2) Coastal Circulation Along Oregon and Washington
3) Initial Statistical Characterization of the Variability of Coastal Winds and Currents
4) Marine Mammals and Seabirds of Oregon and Washington
5) Washington, Oregon and California OCS Fisheries Resource Database
6) Fish Assemblages of Rocky Banks of the Pacific Northwest
7) An Evaluation of Spawning and Recruitment Patterns of Fishes off Northern California, Oregon and Washington.
8) Baseline Socioeconomic Profile of California, Washington and Oregon Coastal Counties
9) Inventory and Evaluation of Washington and Oregon Coastal Recreation Resources
10) Potential Social and Economic Effects of OCS Oil and Gas Activities on Oregon and Washington Indian Tribes.
11) California, Oregon, and Washington Archaeological Resource Study

Study titles proposed for FY 1990 that concern Washington and Oregon include the following:

1) Air Quality Modeling for OCS Lease Sale Nos. 128, 132, and 138
2) Coastal Supplementation of the Oregon and Washington Air Quality Monitoring Network
3) Interannual Variability of Oceanographic Conditions and Circulation Along the Washington Oregon Coast (approved and accelerated to FY 1989)
4) Estuary/Coastal Ocean Exchange Processes
5) Heceta Bank Circulation Study
6) Dynamics of Circulation in the Very Nearshore Domain
7) Coastal Circulation Near Cape Blanco
8) Reconnaissance of Offshore Sediment Chemistry
9) A Summary and Database of Washington-Oregon Coastal Ecology
10) Ecology of Gray Whales Summering off Oregon and Northern California
11) Effects of Oil Fouling on Harbor Seal Pups
12) Washington-Oregon Seabird Study
13) Washington Sea Otter Population Study
14) Social and Economic Changes Related to Oil and Gas Development in Washington-Oregon

C. Study Disciplines

1. Air Quality

Objectives:

The primary objective of the air quality studies funded by the Pacific OCS Region is to improve the accuracy of models used to predict the potential impacts of air quality in the California coastal area from existing and proposed OCS oil and gas activities. The studies are designed to address the concerns of State and local Government agencies regarding the potential degradation of air quality that may result from OCS oil and gas exploration and development.

Study results are used in environmental impact statements (EISs) that are prepared before OCS lease sales, Secretarial Issue Documents (SIDs) for lease sale decisions by the DOI, Environmental Assessments (EAs), and before the MMS review of plans for exploration and development that are submitted by industry. Study results are also used for the DOI regulatory process for OCS air quality permits that are required by MMS for OCS oil and gas development activities.

Strategy:

The strategy of the air quality program is to use state-of-the-art predictive models for each planning area. Emphasis is placed on obtaining accurate field measurements on which to base model input and by which the model predictions may be verified. This requires periodic review of available models and updating of the existing database through Pacific OCS Region sponsored studies.

The study process can be divided into several phases. The first phase attempts to characterize atmospheric dispersion characteristics in coastal environments by collecting and analyzing meteorological and air quality data and conducting tracer studies. The second phase uses the results of the field studies to validate existing air quality models and then modifies the models to improve their applicability and accuracy. Finally, these improved models are used to predict air quality impacts from various types of offshore oil and gas activities.

Use of existing data and coordination with other agencies involved in California coastal air quality studies are also significant aspects of the program strategy.

Activities in Air Quality Studies:

The Pacific OCS Region ESP has sponsored large coastal dispersion studies in the Santa Barbara Channel and the central California area near Pismo Beach, both of which examined the dispersion of an inert tracer gas offshore and in the coastal zone. The studies were designed to test the assumptions of the air quality models about the dispersion of plumes released from potential platforms offshore. The results from both studies are being used in air quality modeling studies for predicting impacts and for regulating OCS oil and gas emissions. Results were also used in the development of the Offshore and Coastal Dispersion (OCD) model described below.

The OCD model was developed by Environmental Research and Technology, Inc. for MMS to be used in OCS air quality regulatory applications. The model was finished and released to the public in March 1985. This model will henceforth be used for inert modeling on the OCS.

Modeling efforts have included air quality analyses for inclusion in EISs for upcoming California lease sales. These efforts include summaries of meteorological data from the National Data Buoy Center (NDBC) buoys. Modeling analyses are done using the OCD model for inert pollutants. At this time the Pacific OCS Region is considering basing future photochemical air quality evaluations on the Plume-Airshed Reactive-Interacting System (PARIS) model. The use of this model will depend largely on the adequacy and compatibility of both onshore and offshore data available as model input. Cumulative assessments are now emphasized more heavily than in previous modeling studies. These studies are coordinated with appropriate Federal, State and local air pollution control agencies as well as industry.

The MMS has contributed funds to a joint industry-agency monitoring program called the South Central Coast Cooperative Aerometric Monitoring Program (SCCCAMP). This is a detailed meteorological and air quality monitoring program that operated in the Santa Barbara Channel area in the summer of 1985. The purpose of this program was to collect data that provide information on physical processes involved in formation of photochemical pollutants in the coastal areas of the study region so that possible effects of offshore oil development on onshore ozone levels can be more accurately determined. The MMS has contributed to the program by funding interagency agreements with the Bureau of Reclamation and National Oceanic and Atmospheric Administration (NOAA). The Bureau of Reclamation provided for the "Operation of a Portable Remote Observation of the Environment (PROBE) Station Network" of meteorological stations, which provided air quality data. Similarly, NOAA operated a dual-doppler radar system to make measurements of the wind field.

The MMS funded two air quality projects during FY 1986 that were extended into FY 1987, including (1) production of archives of the 1985 SCCCAMP data, and (2) a comprehensive analysis of the SCCCAMP database. Following analysis, the SCCCAMP data will be used by participating agencies to evaluate existing photochemical models and to assess potential impacts from OCS activities on onshore air quality. The SCCCAMP data is being used in the study "Photochemical Model Evaluation" during FY 1987-1988. This study will provide a performance evaluation of the PARIS photochemical model that may be used in predicting the effects of OCS air emissions on ozone concentrations.

The NDBC meteorological buoys supported by MMS have been used extensively in various air quality modeling projects. The Pacific OCS Region has used the information in inert modeling EISs for Lease Sale 73 and 80. The data being generated by the buoys provide the necessary parameters for running the OCD model. The buoy data will be used extensively in the air quality analysis for upcoming lease sales. The MMS has received frequent requests from various companies and agencies for NDBC buoy data for use in air quality modeling.

The buoy data have also provided valuable information for the construction of trajectories used in photochemical models such as TRACE (Trajectory Model for Regional Atmospheric Transport, Chemistry and Emissions) and RAPT (Reaction and Pollutant Transport). Data from some of the buoys have been applied in photochemical modeling for exploratory drilling activities in the Santa Maria Basin and offshore Los Angeles County.

Buoy data also provided information used in the MMS sponsored Central California Air Quality Model Validation study (tracer study near Pismo Beach) and in the SCCCAMP field study that took place in September 1985.

A project called "Fugitive Hydrocarbon Air Emissions on OCS Platforms," was approved for funding in FY 1988 but was delayed until FY 1989. The project will measure escaping gaseous hydrocarbons from production equipment such as flanges, valves, and connections on selected OCS platforms. Data on the fugitive emissions are required for input into air quality models (Table 3.).

The planned FY 1989 study on "Air Quality Modeling for Central California OCS Lease Sale 119" has been deferred until FY 1991. The study "Northern California Coastal Aerometric Monitoring Program" was listed in the FY 1989 plan, but was deferred and is now proposed for FY 1990. New study titles proposed for FY 1990 include: "Air Quality Modeling for OCS Lease Sale Nos. 128, 132, and 138"; "Coastal Supplementation for the Oregon and Washington Air Quality Monitoring Network"; "Reasonably Available Control Technology (RACT) Determination for the Pacific OCS"; "Assessment of Methods for PM-10 and Visibility Modeling"; and "Aerometric Data Collection for Recent Lease Sales (or Proposed Lease Sales)."

Table 3. Active, planned, and proposed studies in Air Quality, summarized by fiscal year.

FY	1988	1989	1990	1991	1992	1993
Active:						
Air Quality Modeling of Proposed California OCS Lease Sales 91 and 95	------					
SCCCAMP Data Analysis	------					
Photochemical Model Evaluation	------					
Fugitive Hydrocarbon Air Emissions on OCS Platforms		------	------			
Planned (FY 1989):						
Air Quality Modeling for OCS Lease Sale 119		------	------	(deferred)		
Proposed (FY 1990):						
Northern California Coastal Aerometric Monitoring Program			------	------		
Air Quality Modeling for OCS Lease Sale Nos. 128, 132, and 138			------	------		
Coastal Supplementation of the Oregon and Washington Air Quality Monitoring Network			------	------	------	------
Reasonably Available Control Technology (RACT) Determination for the Pacific OCS			------			
Assessment of Methods for PM-10 and Visibility Modeling			------	------		
Risk Assessment of Sour Gas Production and Transportation			------			
Aerometric Data Collection for Recent Lease Sales			------	------	------	

2. Physical Oceanography and Meteorology

The objectives of the physical oceanography and meteorology studies sponsored by the Pacific OCS Region are to develop sufficient understanding of ocean circulation of the California coast to

a) permit an accurate probabilistic estimate of the trajectories and ultimate distribution of hydrocarbons and other potential pollutants in California coastal waters and

b) facilitate understanding and interpretation of the results of chemical, biological, and geological studies in these waters.

Specifically, the studies are aimed at obtaining observations and numerical simulations of currents and winds required for the DOI Oil Spill-Risk Analysis Model (OSRAM) and predictive air quality models.

Strategy:

As with other discipline topics, the Pacific OCS Region is using existing information whenever possible. The Pacific OCS Region considers circulation modeling and field studies important to increased understanding and proper prediction of the effects of OCS activities and to the design and evaluation of long-term monitoring and cumulative impact studies. Without these physical oceanography studies, the interpretation of other studies is more difficult, and more importantly, the conclusions and predictions drawn from some of the other efforts may not be as reliable. At present, this region is primarily engaged in data collection and analysis. In the future, the emphasis can be expected to move toward (1) developing a capability of describing circulation variability in statistical (both time and space) terms and (2) interdisciplinary studies incorporating physical oceanographic aspects.

Although models of the large scale mean circulation of waters along the California coast are important and necessary, the solutions to many problems encountered in modeling geophysical fluid dynamics are not well understood. Also, although models are capable of simulating some aspects of the circulation off the California coast, at this time they cannot be expected to completely describe (1) the interannual variation in the currents -- a degree of variability that is at least as large as the seasonal variation and (2) the meso- and smaller scale features such as upwelling plumes and eddies associated with capes and headlands. These features are extremely variable, but appear to be capable of transporting potential pollutants counter to the long-term flow. There is also an ongoing effort to assure that physical oceanographic aspects of biological and other studies funded by the Pacific OCS Region are treated adequately. The short- and long-term variability in the physical environment is obviously intimately associated, often in causal manner, with variation in biological communities.

Activities in Physical Oceanography and Meteorology:

The synthesis of oceanographic and meteorological data entitled "Climatology and Oceanographic Analysis of the California Outer Continental Shelf Region" describes the large-scale, average distributions of mass and average wind stress. These data are being used in numerical simulation of the large-scale circulation along the coast by Dynalysis of Princeton, Inc., under a Pacific OCS Region contract.

Meteorological conditions prevailing over the coastal waters of California, Washington, and Oregon are being monitored by eight environmental data buoys funded by the Pacific OCS Region. These buoys provide a unique record, useful in a variety of air quality and physical oceanography studies. The network is designed to generate a database adequate for air quality and oil-spill model needs. After a 5-year period for each buoy, the meteorological data requirements for each location are evaluated in relation to ongoing or future physical oceanographic studies needs. Locations of the buoys are provided in Table 4.

Because of the concentration of active oil and gas development in the Santa Barbara Channel, circulation in this area required more detailed study. A contract for the numerical simulation of circulation in the Santa Barbara Channel and a concurrent observational program was awarded in 1982 to Dynalysis of Princeton, Inc. Under a subcontract to Dynalysis, Science Applications International Corporation conducted the observational program.

A contract for the study of circulation along the central California coast was awarded in September 1983 to Raytheon Service Company. The study used moored current meters and drifters to measure directly the currents in this area. In addition, hydrographic data, satellite imagery, and meteorological observations were collected to assist in the interpretation of the current measurements. Existing historical data are being used to evaluate the subject of interannual variation in circulation in this area, thereby providing a background against which to view and interpret the measurements taken during this program (Table 5.).

Data on coastal winds, currents, and density distribution between San Francisco Bay and the Oregon border are being collected and analyzed by the "Northern California Coastal Circulation Study" (FY 1986 - 1989). The objectives of the project are to produce a coherent picture of the dynamic nature of the mesoscale response to physical forcing mechanisms occurring between the San Francisco Bay and the Oregon border. This study is being closely coordinated with the "Coastal Transition Zone" Program being conducted by various investigators under the sponsorship of the Office of Naval Research. The recently completed "Coastal Wave Statistical DataBase" has provided MMS analysts with access to information on historical wave conditions along the U.S. west coast through an in-house microcomputer.

The study "Coastal Circulation Along Oregon and Washington" (FY 1987) is evaluating the work already done on this topic and assessing the need for additional work in the area. The study "Initial Statistical Characterization of the Variability of Coastal Winds and Currents" (FY 1987 - 1989) is investigating various approaches for quantifying the temporal and spatial variability of surface winds and ocean currents on the U.S. west coast. A modeling study, "Modeling the Circulation of the Southern California Bight," is providing numerical stimulations of the circulation between Point Conception California, and the United States-Mexico border and is expected to be completed in 1990.

For FY 1990 it is proposed that two physical oceanographic and meteorologic studies be continued, including "Operation of the West Coast Meteorological Buoy Network" and "Northern California Coastal Circulation." New studies proposed for FY 1990 include "Interannual Variability of Oceanographic Conditions and Circulation Along the Washington-Oregon Coast (being accelerated for funding in FY 89)," "Ocean Transport Processes Operating between the Santa Barbara Channel and the Santa Maria Basin"; "Estuary/Coastal Ocean Exchange Processes"; "Dynamics Associated with Oceanic Fronts and the Inshore Boundary of the Columbia River Plume"; "Heceta Bank Circulation Study"; "Dynamics of Circulation in the Very Nearshore Domain"; and "Coastal Circulation Near Cape Blanco."

Table 4. Locations of National Data Buoy Center meteorological buoys in the Pacific OCS Region

		Geographical Positions		
Location	Station ID	Latitude	Longitude	Date Deployed
Santa Maria Basin (California)	46011	34°52’8" N	120°52’4" W	10/80
Bodega Basin (California)	46013	38°13’8" N	123°18’1" W	3/81
Point Arena Basin (California)	46014	39°13’3" N	123°58’4" W	4/81
Eel River Basin (California)	46022	40°45’0" N	124°30’0" W	10/81
Point Conception (California)	46023	34°15’0" N	120°40’0" W	12/81
Cape San Martin (California)	46028	34°45’0" N	121°52’0" W	11/83
Cape Foulweather (Oregon)	46040	44°47’0" N	124°20’0" W	6/87
Cape Elizabeth (Washington)	46041	47°25’0" N	124°32’0" W	6/87

Table 5. Active and proposed studies in Physical Oceanography and Meteorology, summarized by fiscal year.

FY	1988	1989	1990	1991	1992	1993
Active:						
Operation of a West Coast OCS Meteorological Buoy Monitoring Network	------	------	------	------	------	------
Central California Coastal Circulation Study	------	------				
Coastal Circulation Along Washington and Oregon	------	------				
Northern California Coastal Circulation	------	------	------	------		
Initial Statistical Characterization of the Variability of Coastal Winds and Currents	------	------				
Modeling Circulation in the Southern California Bight	------	------				
Planned (FY 1989):						
Interannual Variability of Oceanographic Conditions and Circulation along the Washington-Oregon Coast			------	------	------	
Proposed (FY 1990):						
Ocean Transport Processes Operating Between the Santa Barbara Channel and the Santa Maria Basin			------	------		
Estuary/Coastal Exchange Processes			------	------	------	------
Dynamics Associated with Oceanic Fronts and the Inshore Boundary of the Columbia River Plume			------	------	------	
Heceta Bank Circulation Study			------	------	------	------
Dynamics of Circulation in the Very Nearshore Domain			------	------	------	------
Coastal Circulation Near Cape Blanco			------	------	------	------

3. Fates, Effects and Chemistry

This study discipline supports research on the chemical nature, dispersal, and distribution of hydrocarbons, metals, and particulates associated with permitted or accidental discharges from OCS oil and gas activities. Studies include the transport and transformation of chemical and particulate pollutants and their effect on the receiving waters, sediments, species and marine communities.

Objectives:

The objectives of this study discipline are to (1) understand the physical and chemical behavior of discharged drilling fluids, produced waters, and hydrocarbons, and (2) evaluate the response of animal species and marine communities to short- and long-term exposure to the discharges.

Strategy:

In the early stages of the Pacific OCS Region's environmental studies program, the concentrations of trace metals and hydrocarbons in the water, sediment and biota were determined over broad regional areas. These benchmark studies were intended to establish baseline levels of environmental contamination and animal distributions so that impacts from future drilling activities could be determined. This strategy was largely abandoned after a 1978 review by the National Academy of Sciences, because the environment was found to be more variable than anticipated, and statistically valid baselines could not be established. In particular, collection of water quality data are not appropriate because of the high spatial variability that results from rapid mixing and dilution around open-ocean discharges.

Whereas general or broad area baseline surveys of sediment chemical and physical parameters are not justifiable, a one-time reconnaissance may be appropriate where adequate prelease data on sediment chemistry are not available. However, collection of water samples for chemical analysis will generally not be supported.

Studies of fates, effects, and chemistry now stress postlease issues and information needs that are directed to specific decisionmaking. Therefore, studies are often an integral part of long-term monitoring efforts. These are major, multidisciplinary, process-oriented programs that attempt to understand anthropogenic changes, resulting from OCS oil and gas activities, in the context of natural ecosystem variability. The emphasis of long-term monitoring is to identify and assess chronic, low-level effects of OCS oil and gas development on biological communities.

Whereas laboratory effects studies may provide some insight into the short-term response of selected marine organisms to pollutant stress, the results of such studies are difficult to extrapolate to "real-world conditions." Hence, current and future MMS funding will focus on multi-year field programs that are designed with rigorous experimental design and hypothesis testing.

Activities in Fates, Effects, and Chemistry Studies:

Early environmental studies activities associated with fates, effects and chemistry included the "Southern California Baseline Studies," which attempted to establish chemical "benchmark" concentrations of hydrocarbons and metals. Associated with the baseline studies were contracts to enhance our ability to measure metal contaminants including "Analysis of Marine Samples for Lead" (1976), Barium and Cadmium" and a "Barium and Vanadium Methodology Study" (1977). The U.S. Geological Survey provided information on "Erosion and Transport of Sediments and Pollutants on the San Pedro Shelf" (1978).

The lethal and sublethal effects of the soluble fraction of Santa Barbara crude oil were evaluated during the "California Commercial and Sports Fish Oil Toxicity Study." The eggs, larvae, juveniles and adults of northern anchovy (Engraulis mordax), California halibut (Paralichthys californicus) and mussel (Mytilus californianus) were tested for several days to several weeks to determine potential crude oil effects on development and growth, in addition to mortality.

The mixing and dispersal of materials from OCS platforms were addressed by two studies. The "Formation Water Dispersion Study" modeled produced (formation) water discharges, and the "Assessment of the Long-Term Fate and Effective Methods of Mitigation of California OCS Platform Particulate Discharges" described the fate of drilling fluids after discharge on the shelf.

In FY 1983 the Pacific OCS Region funded Phase I of the "Long-term Monitoring Study". Phase I was a benthic reconnaissance of soft- and hard-bottom communities in the Santa Maria Basin and Western Santa Barbara Channel, and was designed to assess benthic variability in the area and to recommend appropriate station locations for a multiyear monitoring effort. The Phase II study was awarded in July 1986 and will last 5 years. The primary goal of this project is a definitive analysis of the long-term environmental effects of platform discharges around oil and gas production platforms in an area that has had no prior oil and gas development. In FY 1989, a study will be initiated that compliments and supplements the objectives of the long-term benthic monitoring effort. Entitled "Effects of an Oil and Gas Production Platform on Rocky Reef Fishes and Fisheries," the study will assess fish ecology and the effects of platform discharges on fishes that live adjacent to a production platform in the Santa Maria Basin (Table 6.).

The ability of the marine benthic community to adapt to the long-term exposure to crude oil is being evaluated in the study entitled "Adaptation of Marine Organisms to Chronic Hydrocarbon Exposure." The structure and function of the biological communities that grow in and around natural oil seeps off Santa Barbara are being compared with similar communities growing in adjacent non-seep sites.

For FY 1990 several studies are proposed under the topic Fates, Effects and Chemistry including, "Sediment Flux in the Santa Barbara Channel: Physical-Chemical Relationship to Drilling Muds Deposition and Fate"; "An Assessment of Heavy Metal and Hydrocarbon Input into the Southern California Planning Area by Age-Dated Box Cores"; "Reconnaissance of Offshore Sediment Chemistry"; Evaluation of Potential Impact of Oil Spills on Neustonic Organisms and Their Predators"; "Effect of Petroleum Operations on Metal

Metabolism of Marine Organisms"; "Assessment of Background Seawater Chemical Compositions for the Santa Barbara Channel"; "Monitoring Biological Impacts of Oil and Thermal Discharge in Pacific Coastal Waters"; and "Reestablishment and Recovery of OCS Hard Substrate Communities."

Table 6. Active, planned, and proposed studies in Fates, Effects, and Chemistry, summarized by fiscal year.

	FY 1988	1989	1990	1991	1992	1993
Active:						
Adaptation of Marine Organisms to Chronic Hydrocarbon Exposure	------					
Monitoring: Assessment of Long-Term Changes in Biological Communities: Phase II	------	------	------	------		
Planned (FY 1989):						
Effects of an Oil and Gas Production Platform on Rocky Reef Fishes and Fisheries		------	------	------		
Proposed (FY 1990):						
Sediment Flux in the Santa Barbara Channel: Physical-Chemical Relationship to Drilling Muds Deposition and Fate			------	------	------	
An Assessment of Heavy Metal and Hydrocarbon Input into the Southern California Planning Area			------			
Reconnaissance of Offshore Sediment Chemistry			------	------		
Evaluation of Potential Impact of Oil Spills on Neustonic Organisms and Their Predators			------	------	------	
Effect of Petroleum Operations on Metal Metabolism of Marine Organisms Exposed in Situ			------	------	------	
Assessment of Background Seawater Chemical Compositions for the Santa Barbara Channel			------	------		
Monitoring Biological Impacts of Oil and Thermal Discharge in Pacific Coastal Waters			------	------	------	
Reestablishment and Recovery of OCS Hard Substrate Communities			------	------	------	------

4. Biology and Ecology

This study discipline includes Pacific OCS Region studies of marine biota that do not include the marine mammals, seabirds amd endangered species discipline topic. This group of studies includes marine community and population dynamics, colonization experiments, ecological characterizations, and biological data summaries. Included are the flora and fauna of intertidal, benthic, and nekton habitats.

Objectives:

The primary objectives of this study discipline include describing marine habitats, communities, and populations, and understanding their natural variability in space and time; identifying potential significant impacts to marine organisms from OCS oil and gas activities; and recommending appropriate mitigating measures when significant effects are identified.

Strategy:

A major emphasis of the biology and ecology studies has involved the review, summarization and synthesis of existing published and unpublished literature. This approach ensures that all available information that is relevant to the environmental assessment process and the preparation of Environmental Impact Statements (EISs) is in formats that can be readily accessed and used by MMS analysts. Major accomplishments include the three summary of knowledge reports that covered southern California, northern California, and Oregon and Washington, as well as the "Central and Northern California Ecological Characterization Study." These efforts at review and synthesis are ongoing. A project is currently underway to provide MMS with a text on "The Ecology of the Southern California Bight: A Synthesis and Interpretation," and funding is proposed for a summary of information for the Washington-Oregon frontier area.

Once existing knowledge is summarized and data gaps are identified, a second major emphasis of the biology and ecology studies have been field studies to characterize habitats and communities and understand how the associated animals vary in space and time. These efforts are needed because a prerequisite to understanding how the biological environment responds to activities associated with OCS oil and gas development, or to any anthropogenic influence, is a knowledge of how ecosystems behave under natural conditions. Natural environmental variability must be described in relation to the extent and magnitude of perturbations that may result from man's activities. In this context, the biology and ecology program emphasizes the understanding of broad ecosystem processes and the relationships of physical and chemical environments to biological systems. An example of this type of study is the ongoing "Succession and Seasonal Variation of the Central and Northern California Rocky Intertidal Communities."

Finally, a third area of MMS support for the Biology and Ecology discipline involves actual field experiments. This effort attempts to evaluate potential impacts of OCS activities using scientifically designed procedures. This rationale is incorporated in several ongoing studies, including the

"Intertidal Communities" study mention above and by studies listed under the Fates, Effects, and Chemistry discipline topic, which are evaluating the impacts of platform discharges on marine benthic and fish communities.

Activities in Marine Ecology Studies:

In FY 1983, the Pacific OCS Region initiated a long-term study entitled "Successional and Seasonal Variation of the Central and Northern California Rocky Intertidal Communities." This study is gathering marine community competition and succession information to help analyze recovery rates of intertidal communities disturbed by natural and man-made processes. Community and species recovery rates for central and northern California biota are being compared to similar information gathered in the past for southern California biota to analyze latitudinal differences in recovery rates. This information will be important in predicting and assessing effects of potential oil spills on these communities. The first phase of this study (completed in 1985) summarizes and synthesizes ecological information on recovery and successional processes for central and northern California from the local and worldwide literature.

The MMS has been placing increased emphasis on fishes and fisheries issues in the last few years. Historically, the National Marine Fisheries Service, State Departments of Fish and Game, and other agencies or universities specifically involved with fisheries issues have been at the forefront of marine fisheries research. Due to the special nature of the MMS offshore oil and gas program, it is becoming more important for MMS to fill data or information gaps that directly relate to potential impacts of these activities. In FY 1985, a study was initiated on the "Effects of Offshore Geophysical Acoustic Survey Operations on Fish" and was designed with the assistance of joint oil industry and fishing industry recommendations. The focus of the study was the extent to which seismic operations affect fish schools and influence their catchability. Another fisheries study initiated during FY 1985, entitled "California OCS Fisheries Database," is providing on-line access to fisheries catch data, including mapping routines for plotting catch statistics.

A major synthesis and scholarly critique of marine ecological knowledge of ocean waters of southern California is the goal of the study entitled "Ecology of the Southern California Bight: A Summary and Interpretation." This study will update and compile the available data on the marine ecology of the Bight region; results will be published as a hard-cover book (Table 7.).

In FY 1987, a study entitled "Biological Reconnaissance of Potentially Sensitive Benthic Habitats in Selected Areas of the Three California Planning Areas" surveyed soft- and hard-bottom benthic communities in areas of potential oil and gas activities that have not been previously studied.

Studies awarded during FY 1988 included the "Washington, Oregon, and California OCS Fisheries Resource Database," which will increase the geographical coverage of the previous "California OCS Fisheries Database." "An Evaluation of Spawning and Recruitment Patterns of Washington, Oregon, and Northern California Fishes" will summarize spawning distributions of fishes and describe the early life-history of flatfishes in the Pacific Northwest.

"Fish Assemblages of Rocky Banks of the Pacific Northwest" will use submersibles and Remotely Operated Vehicles (ROV) to examine fishes and fishery habitats on offshore reefs.

Planned for FY 1989 is a "Taxonomic Atlas of the Santa Maria Basin Fauna." New studies proposed for FY 1990 include "A Summary and Database of Washington-Oregon Coastal Ecology," and "Effects of Geophysical Survey Acoustic Signals on the Spawing of Rockfish."

Table 7. Active, planned, and proposed studies in Biology and Ecology, summarized by fiscal year.

	FY 1988	1989	1990	1991	1992	1993
Active:						
California Outer Continental Shelf Fisheries Database	------					
Ecology of the Southern California Bight: A Summary and Interpretation	------	------				
Biological Reconnaissance of Selected Benthic Habitats within Three California OCS Planning Areas	------	------				
Washington, Oregon, and California OCS Fisheries Resource Database	------	------	------			
An Evaluation of Spawning and Recruitment Patterns of Washington, Oregon and Northern California Commercial Fishes	------	------	------			
Fish Assemblages of Rocky Banks of the Pacific Northwest	------	------	------			
Planned (FY 1989):						
Taxonomic Atlas of the Santa Maria Basin Fauna		------	------	------	------	
Proposed (FY 1990):						
A Summary and Database of Washington-Oregon Coastal Ecology			------	------		
Effects of Geophysical Survey Acoustic Signals on the Spawning of Rockfish			------	------		

5. Marine Mammals, Seabirds, and Endangered Species

Objectives:

The primary objective of the marine mammals, seabirds, and endangered species studies funded by the Pacific OCS Region is to determine and minimize significant risks to the marine mammal and seabird populations from potential impacts of OCS oil and gas development. The results of these studies are used to enhance and update information used for decision documents such as, Environmental Impact Statements (EISs), Secretarial Issue Document (SIDs), and Environmental Assessments (EAs), for exploration, development, and production plans pertaining to the OCS oil and gas activities.

Strategy:

The Pacific OCS Region's strategy for the marine mammal and seabird studies, including federally listed endangered and threatened species such as the gray whale and California sea otter, is to determine (1) the general and detailed distribution, abundance and seasonality of animals present in and near the Pacific OCS Region Planning Areas; (2) the causes or reasons for distribution patterns; (3) the vulnerability of marine mammal and seabird species to OCS activities and the significance of any risk associated with OCS oil and gas development; (4) survival and recruitment rates of selected species determined to be susceptible to impacts from OCS activities; and (5) when significant risks to marine mammals or seabirds from OCS operations are identified, to develop and evaluate mitigating measures.

In addition to studies funded by MMS, the Pacific OCS Region uses study results from other sources to assist in the preparation of environmental decision documents prepared by the MMS. Private research institutions and academic and governmental sources are also tapped for their pertinent information. Examples include work on sea otters by the California Department of Fish and Game and the U.S. Fish and Wildlife Service, the Point Reyes Bird Observatory's work on the Farallon Islands, and the National Marine Fisheries Service studies on marine mammals. The organizations have produced excellent information that has been useful to MMS information needs.

Activities in Marine Mammal and Seabird Studies:

The Pacific OCS Region has funded several comprehensive marine mammal and seabird surveys during the past decade, including the "Southern California Marine Mammal and Seabird Study" and the complementary "Central and Northern California Marine Mammal and Seabird Study," which were conducted by the University of California at Santa Cruz. In 1980, with BLM funding, the U.S. Fish and Wildlife Service (FWS) completed a 2-year survey of the nesting seabirds of California. In 1983, the FWS prepared a report titled "Synthesis of Available Information on California Sea Otters," which summarized the survey and tagging studies of the California sea otter population conducted by FWS and California Department of Fish and Game during the past 10 years. The "Seabird Oil-Spill Behavior Study," conducted by scientists from Nero and Associates, was completed in 1983. This study examined the behavior of seabirds in and near naturally occurring oil seeps offshore Santa Barbara, California. The "Seabird Oil Toxicity Study," completed in 1987 by Nero and

Associates, examined the long-term effects of oil on two species of seabirds. Ecological Consulting has completed the "Southern California Marine Mammal and Seabird Risk Analysis Study."

The University of Minnesota has completed studies for MMS on "The Population Status of the California Sea Otters." This information along with results from the MMS oil-spill model are used to determine what segments of the sea otter's range are subject to the greatest risk. Results of the study included recommendations to appropriate agencies to stockpile oil-spill containment devices and sea otter cleaning and rehabilitation equipment at specific areas of concern. The "Sea Otter Oil-Spill Mitigation Study," awarded in FY 1984 to Hubbs Sea World Research Institute, analyzed the effects of oil on sea otters and has developed oil-spill mitigation measures for the southern sea otter population offshore California. Using an analysis of existing information, this study also evaluated the effects of oil dispersants on otters and other marine organisms in the region. The "Sea Otter Oil-Spill Avoidance Study" investigated techniques to move otters in the event of an oil spill and evaluated the possible effect of an oil spill on the sea otter's habitat.

Another completed study is the "California Seabird Ecology Study," awarded in FY 1984 to the University of California to study important feeding areas and foraging ranges for California seabird populations. Satellite imagery was used to correlate upwelling areas and ocean fronts with important seabird feeding areas.

Active projects include the FY 1988 studies entitled "Marine Mammals and Seabirds of Oregon and Washington" and "California Seabird Colony Catalog." The "Gray Whale Monitoring Study" is documenting gray whale behavior and migration distance offshore Point Sal, California, which is adjacent to the location of a proposed oil and gas development and production platform. "Marine Mammal and Seabird Databases," is an approved FY 1989 study to synthesize existing databases on California marine mammal and seabird distribution studies and provide a method of easy manipulation of this data for the staff analysts (Table 8.).

Studies proposed for FY 1990 include "Least Tern Colony Occupation and Disturbance Inventory"; "Effects of Oil Fouling on Harbor Seal Pups"; "Feeding Ecology of Steller Sea Lion"; "Ecology of Gray Whales Summering off Oregon and Northern California"; "Fur Seal Cleaning Study"; "Oregon and Washington Seabird Study"; "Washington Sea Otter Population Study"; and "Monitoring the Level of Contaminant Residues and Their Biological Effects in Nesting Seabirds" (Table 8.)

Table 8. Active, planned, and proposed studies of Marine Mammals, Seabirds, and Endangered Species, summarized by fiscal year.

	FY 1988	1989	1990	1991	1992	1993
Active:						
Gray Whale Monitoring Study	------					
Marine Mammals and Seabirds of Oregon and Washington	------					
California Seabird Colony Catalog	------					
Planned (FY 1989):						
Marine Mammal and Seabird Databases		------				
Proposed (FY 1990):						
Least Tern Colony Occupation and Disturbance Inventory			------			
Effects of Oil Fouling on Harbor Seal Pups			------			
Feeding Ecology of Steller Sea Lion			------	------		
Ecology of Gray Whales Summering off Northern California and Oregon			------	------		
Fur Seal Cleaning Study			------			
Oregon and Washington Seabird Study			------	------	------	------
Washington Sea Otter Population Study			------			
Monitoring the Level of Contaminant Residues and their Biological Effects in Nesting Seabirds			------	------	------	------

6. Social and Economic

This study discipline is a broad category that includes studies in the following topics:

- Recreation
- Visual and aesthetic resources
- Archaeology and cultural resources
- Transportation systems
- Demographics (population characteristics)
- Land use
- Economics
- Commercial and sport fishing
- Navigation and shipping

Much information on these topics has been obtained from Federal, State, and local programs. Examples are inventories of recreation and visual resources and archaeological sites. Studies have been conducted that summarize the available data (i.e., recreation and archaeology) or that evaluate the available data using a consistently applied set of standards (i.e., aesthetic and visual coastal resource ranking).

Objectives:

The objectives of the social and economic studies are to identify and predict the level of impact that may result from OCS oil and gas activities. Areas of particular concern are impacts on employment, population, local facilities, budgetary planning at the county and community levels, commercial fishing industry, and coastal recreation use.

A better understanding of the number of jobs created at each phase of OCS activity will permit more accurate predictions of localized impacts. Information related to the use of local labor and the extent of displacement of labor from local industry can help MMS predict impacts on the local economic structure. Specific information related to the oil industry employment requirements and its use of local labor will allow improved population forecasts to be used in Environmental Impact Statements (EISs). Determining the number of families that will be moving into a community can affect a whole array of decisions concerning socioeconomic issues. Thus, employment and population growth predictions will impact local land use policy; water supply requirements; housing, fire, and police protection; health care; transportation; school facilities; and the levels of Government spending.

Knowledge of community facilities, services standards and requirements, and projected needs and plans for expansion can help in assessing the adequacy of local communities' preparedness to meet OCS-related demands, as well as the resulting fiscal implications for the affected communities.

Strategy:

As the size of areas offered for leasing grows, the data collection effort will become more extensive. Leasing offshore of less populated, less urbanized counties in central and northern California, Washington, and Oregon may also require new field data collection efforts. Predictive analysis has generally only been done for the economic and demographic effects of OCS activity. Although this type of analysis must be general, since the resource and development estimates upon which it is based are highly probabilistic, studies of this kind are becoming more important. Site-specific technical papers were contracted out for the prelease EIS's for Sales 48, 53 and 68.

The case studies awarded in FY 1983 and 1984 have added an important database for predicting the local impacts of OCS oil and gas development. Another study, awarded in FY 1986, will contribute baseline information for the economic and social profiles for all of California, Oregon, and Washington coastal counties.

Activities in Socioeconomic Studies:

The potential impacts of OCS development on the recreational and aesthetic quality of the region have been of great concern in California. A survey of visual, aesthetic, and recreational resources along the California coast has been completed (The Granville Corporation 1981). Also, another completed study, "Impacts of OCS Development on Recreation and Tourism," produced a model which is used for quantifying the economic effects of any changes in beach attendance due to OCS development.

Potentially conflicting uses of the seabed arise where OCS development occurs in shipping lanes and fishing areas. Navigation studies have been conducted by the U.S. Coast Guard and California Coastal Commission. In addition, the interaction between the commercial and recreational fishing industries and activities related to OCS oil and gas development have been studied by the Pacific OCS Region. Two studies were completed in FY 1984. The first study, "Mitigation of Sea Floor Conflicts Between Oil and Gas Pipelines and Commercial Trawl Fisheries," identified methods to avoid or minimize potential problems to commercial trawl fishing caused by vessels installing oil and gas pipelines. The second study, entitled "Cumulative Socioeconomic Impacts of OCS Oil and Gas Development in the Santa Barbara Channel Region: A Case Study," contains profiles of the socioeconomic characteristics of Santa Barbara and Ventura Counties, California. The effects of offshore oil and gas development in Federal and State waters have been estimated for selected characteristics of the two counties.

Another study, "Economic and Demographic Profile of San Luis Obispo County," (California) has generated the needed data for input to models used to predict the impact of OCS activities in the region. This effort was followed by a study in FY 1986 on "Socioeconomic Baseline Profile of California, Oregon and Washington of Coastal Counties" (Table 9.).

A socioeconomic study initiated during FY 1988 was "Inventory and Evaluation of Washington and Oregon Coastal Recreation Resources." Two studies that were approved during FY 1988, but have been delayed until FY 1989, include "California, Oregon and Washington Archaeological Resources Study" and "Potential Social and Economical Effects of OCS Oil and Gas Activities on Oregon and Washington Indian Tribes."

Proposed for FY 1990 funding is a study entitled "Social and Economic Changes Related to Oil and Gas Development in Washington-Oregon."

Table 9. Active, planned, and proposed studies in Social and Economic, summarized by fiscal year.

	FY 1988	1989	1990	1991	1992	1993
Active:						
Baseline Socioeconomic Profile of California, Washington and Oregon Coastal Counties	------					
Inventory and Evaluation of Washington and Oregon Coastal and Recreational Resources	------					
Planned (FY 1989):						
California, Oregon, and Washington Archaeological Resource Study	---------					
Potential Social and Economic Effects of OCS Oil and Gas Activities on Oregon and Washington Indian Tribes	------					
Proposed (FY 1990):						
Social and Economic Changes Related to Oil and Gas Development in Washington and Oregon			------			

7. Program Support

This study discipline consolidates those activities that enhance the management, communication and distribution of the results of MMS environmental studies or facilitate their completion. Also included are cooperative agreements with state institutions to promote innovative studies of OCS issues.

Objectives:

The objectives of studies in the program support area are to devise and implement techniques and procedures that increase the efficiency of the studies program, to contribute to the scientific and managerial value of studies undertaken in all topic areas, and to implement a variety of forums that will enhance the dissemination of results and information obtained through the Pacific OCS Region Environmental Studies Plan (ESP).

Strategy:

The Pacific OCS Region supports public meetings, conferences and workshops in each of the Pacific OCS Region Planning Areas in which environmental studies information is described and recommendations are solicited for specific study topics or broader study objectives. Another major effort is in the area of automated information management. Computer access to information from previous studies permits rapid and extensive manipulation, synthesis, and display of results required in preparation of the wide variety of environmental documents produced by the Pacific OCS Region. The storage of contract information increases the efficiency of contract administration, especially the tracking of contract costs. The Pacific OCS Region has made significant progress toward database automation and anticipates that activity in this program will increase.

Activities in Program Support:

The Region has sponsored three Information Transfer Meetings (ITM). The latest ITM was held in San Francisco, California, May 4-6, 1987. There were over 40 speakers covering topics ranging from fisheries to socioeconomics. In addition, an evening workshop on "The Procurement Process and Opportunities for Involvement" was conducted for interested parties. The next ITM is scheduled for May 31 - June 1, 1989, in Santa Barbara. The proposed FY 1990 "Information Transfer Meeting" would provide funds for ITMs to be held in FY 1991, 1992, and 1993 (Table 10.).

A "Conference/Workshop on Recommendations for Studies in Washington and Oregon Relative to Oil and Gas Development" was sponsored by the Region. Held in Portland, Oregon from May 23-25, 1988, the meeting was attended by 250 persons. Invited experts discussed existing knowledge of marine and coastal resources in the Pacific Northwest, and workshop participants presented recommendations for environmental studies as related to OCS oil and gas prelease and postlease information needs. A proceedings volume is being distributed to workshop attendees and MMS depository libraries.

As the ESP has matured, automated data processing has become a critical element of the administration and management of contracts and study results. Through a procurement with Howard University entitled "Environmental Database Management Study," the Pacific OCS Region procured a UNIX based microcomputer (AT&T 3b2/400), terminals, and software to handle a variety of automated data processing needs, including word processing, database, and spreadsheet.

The "Southern California Educational Initiative" is planned for funding during FY 1989. The objective of this initiative is to provide long-term support for innovative, interdisciplinary studies of offshore issues within an academic, peer-review environment. California State academic institutions, nominated by the Governor, will be invited to submit proposals for a competitive, cooperative agreement. Proposals will be evaluated, in part, as to their applicability to MMS and cooperating State information needs relating to offshore oil and gas concerns. Pending an annual review of progress, the Initiative may be renewed for a period of five years.

Table 10. Active studies in Program Support, summarized by fiscal year.

FY	1988	1989	1990	1991	1992	1993
Active:						
Information Transfer Meeting	------	------	------			
Conference and Workshop for Studies in the Washington-Oregon Planning Area	------					
Planned (FY 1989):						
Southern California Educational Initiative		------	------	------	------	------
Proposed (FY 1990):						
Information Transfer Meeting			------	------	------	------

D. Approved FY 1989 Study Topics

The following ongoing studies were identified for incremental funding in FY 1989:

- Northern California Coastal Circulation Study
- Operation of West Coast Meteorological Buoy Network
- Monitoring: Assessment of Long-Term Changes in Biological Communities (Santa Maria Basin Monitoring Program) Phase II
- Succession and Seasonal Variation of the Central and Northern California Rocky Intertidal Communities as Related to Natural and Man-Induced Disturbances
- Fish Assemblages of Rocky Banks of the Pacific Northwest
- California Seabird Colony Catalog
- Washington, Oregon, and California OCS Fisheries Resource Database
- An Evaluation of Spawning and Recruitment Patterns of Washington, Oregon, and Northern California Fishes
- Inventory and Evaluation of Washington and Oregon Coastal Recreation Resources

The following new studies were identified for funding during FY 1989:

- Fugitive Hydrocarbon Air Emissions on OCS Platforms (delayed from FY 1988)
- Effects of an OCS Oil and Gas Production Platform on Rocky Reef Fishes and Fisheries
- Marine Mammal and Seabird Databases
- Air Quality Modeling for Central California OCS Sale 119
- Taxonomic Atlas of the Santa Maria Basin Fauna
- California, Oregon, and Washington Archaeological Resources Study (delayed from FY 1988)
- Potential Social and Economic Effects of OCS Oil and Gas Activities on Oregon and Washington Indian Tribes (delayed from FY 1988)
- Southern California Educational Initiative (funded by Headquarters during FY 1989)
- Interannual Variability of Oceanographic Conditions and Circulation Along the Washington-Oregon Coast (accelerated from FY 1990)

Chapter IV. California, Washington, and Oregon Study Topics for Fiscal Year 1990

A. Study Topics for FY 1990

This chapter describes proposed FY 1990 study topics for the Pacific OCS Region. Studies were evaluated by the DOI criteria as listed in appendix A. Section B presents the preliminary ranking for all proposed FY 1990 studies by priority order. The MMS will contract for the studies based on the results of the national ranking, assuming adequate FY 1990 funds are appropriated and adequate staff is available.

Several dozen study recommendations were received from individuals, organizations, and Government agencies in response to the Pacific OCS Region's call for participation in the Fiscal Year 1990 Draft Environmental Study Plan. Some proposed studies were submitted, as required, as a 2 to 3-page prospectus (i.e., study description), but many other titles or topics were submitted without the required documentation. Proposed studies that were submitted with the appropriate supporting documentation were evaluated and ranked by MMS staff and are listed in Section B. Section C lists study titles that were received but not ranked, because they lacked supporting documentation.

B. FY 1990 Study Topics Ranking*

Continuing studies (this group will be funded before initiating new studies):

1) Northern California Coastal Circulation Study
2) Operation of West Coast Meteorological Buoy Network
3) Monitoring: Assessment of Long-Term Changes in Biological Communities, Phase II
4) Southern California Educational Initiative
5) Fish Assemblages of Rocky Banks of the Pacific Northwest
6) California Seabird Colony Catalog
7) Taxonomic Atlas of Santa Maria Basin Fauna
8) Central and Northern California Rocky Intertidal Recovery Study
9) Interannual Variability of Oceanographic Conditions Along the Washington-Oregon Coast

Proposed new studies:

Class A1B1

10) Reasonably Available Control Technology (RACT) Determination for the Pacific OCS

Class A2B1

11) A Summary and Database of Washington-Oregon Coastal Ecology
12) Information Transfer Meeting
13) Reestablishment and Recovery of OCS Hard Substrate Communities

Class A2B2

none

Class A2B3

14) Northern California Coastal Aerometric Monitoring Program
15) Air Quality Modeling for OCS Lease Sales Nos. 128, 132, and 138

Class A3B1

16) Ocean Transport Processes Operating Between the Santa Barbara Channel and the Santa Maria Basin

Class A3B2

17) Assessment of Methods of PM-10 and Visibility Modeling
18) Social and Economic Changes Related to Oil and Gas Development in Washington-Oregon
19) Aerometric Data Collection for Recent Lease Sales (or Proposed Lease Sales)
20) Risk Assessment of Sour Gas Production and Transportation
21) Dynamics of Circulation in the Very Nearshore Domain
22) Heceta Bank Circulation Study
23) Reconnaissance of Offshore Sediment Chemistry
24) Dynamics Associated with Oceanic Fronts and the Inshore Boundary of the Columbia River Plume
25) Physical and Biological Dynamics of the Neuston and Microlayer
26) Coastal Circulation Near Cape Blanco

Class A3B3

27) Estuary/Coastal Ocean Exchange Processes
28) Coastal Supplementation of the Oregon and Washington Air Quality Monitoring Network
29) Effects of Oil Fouling on Harbor Seal Pups
30) Ecology of Gray Whales Summering off Oregon and Northern California
31) An Assessment of Heavy Metal and Hydrocarbon Input into the Southern California Planning Area by Age-Dated Box Cores
32) Evaluation of Potential Impact of Oil Spills on Neustonic Organisms and Their Predators
33) Sediment Flux in the Santa Barbara Channel: Physical-Chemical Relationship to Drilling Muds Deposition and Fate
34) Washington-Oregon Seabird Monitoring Study

Class A4B3

35) Least Tern Colony Occupation and Disturbance Inventory
36) Feeding Ecology of Steller Sea Lion
37) Effect of Petroleum Operations on Metal Metabolism of Marine Organisms Exposed in Situ
38) Fur Seal Cleaning Study
39) Washington Sea Otter Population Study
40) Effects of Geophysical Survey Acoustic Signals on the Spawning of Rockfish
41) Monitoring Biological Impacts of Oil and Thermal Discharge in Pacific Coastal Waters
42) Assessment of Background Seawater Chemical Compositions for the Santa Barbara Channel

* Consecutive numbers indicate priority within a particular class.

C. Proposed Study Titles Lacking Adequate Documentation for Evaluation and Ranking

Air Quality
- Monitoring of Acid Deposition and Visibility Along the Washington and Oregon Coast
- Extension of Air Quality Modeling for Central California OCS Lease Sale 119 into 1990

Physical Oceanography and Meteorology
- Meteorological Buoy Network: Two New Buoy Locations off Central California
- Currents of Nearshore Areas off Humboldt Bay

Geology
- Side-Scan Surveys of Sale 91 Tracts

Fates, Effects, and Chemistry
- Enhance the Oil Spill Risk Analysis Model (OSRAM)
- Ecological Studies Regarding the Effects of Oil Spills on Coastal and Marine Resources

Biology and Ecology
- Identification and Location of Unusual Species and Assemblages in the Rocky Intertidal of Central and Northern California
- Study of Benthic Organisms off Central and Northern California
- Fisheries Economics as Influenced by OCS Oil and Gas Activities: A Model
- A Retrospective: What have been the Impacts to Resources of the Santa Barbara Channel from OCS Activities?
- Five-Year Update of the California Fisheries Database
- Identification of Important Spawning Habitats and Nursery Areas for Fishes off Oregon and Washington
- Evaluation of Seasonal and Interannual Factors that Influence Larval Recruitment, Distribution and Year-Class Strength of Dungeness Crab
- Oceanographic Dynamics Associated with the Early-Life History and Recruitment of Crabs
- Effects of Geophysical Seismic Surveys on Salmon (or other species)
- Ecology of OCS Oil and Gas Platforms as Related to Recreational Fishing
- Effects of Acoustical (Seismic Testing) Devices on Eggs and Larvae of Fishes
- Locations of Major Fishery Resources
- Current and Potential Utilization of Oil and Gas Platforms by Recreational Fishermen
- The Effect of Magnetic Fields from Oil Platforms on the Movements of Pelagic Fishes

Endangered Species
- Conservation Programs to Enhance the Recovery of Species Presently at Risk from Oil and Gas Projects: California Least Tern

Social and Economic

- Service and Fiscal Capacity Analysis of Local and Tribal Communities
- Review and Synthesis of Similar Experiences
- Scenarios of Exploration, Development and Production
- Legal Framework and Procedures Available for Mitigation, Protection, Payments, Mediation, Agreements, Informal Agreements
- Economic Impacts to Industries Competing for Space within Multiple Resource Areas Subject to OCS Oil and Gas Development or Exploration
- Site-Specific Analysis and Industry Location Feasibility Study for Development of Sale 128 Leases
- Studies of Recreation and Tourism
- Onshore Facilities Required to Support Offshore Oil and Gas Exploration, Recovery and Transport
- Effect on Recreation Areas and Public Beaches, Changes in Sand and Sediment Patterns and the On-Going Beach Replenishment Program
- Potential Interference with the Existing Chevron Offshore Marine Terminal in Santa Monica Bay

Program Support

- Abstract all Completed MMS Studies in a Single Review Guide
- Develop Comprehensive Record of all MMS Studies under a Single Indexing System
- Create Additional Repositories of MMS Studies Reports
- Enhance the Accessibility of (MMS) Studies Results in More Easily Utilized Formats

D. FY 1990 Studies Descriptions

The following pages provide a detailed description of each proposed FY 1990 study as listed in Section B. Continuing studies are listed first, followed by planned new studies.

Regional Study No.: 1

Title: Northern California Coastal Circulation Study (continuation)

Region: Pacific

Proposed Period of Performance: FY 1986 - FY 1990 (5 Years)

Cumulative Project Cost: $5,022,948

Applicable Planning Area(s): Northern California

Key Words: northern California, physical oceanography, coastal circulation, current meters, satellite imagery, drifter tracks, temperature/salinity measurements

Description of Proposed Project

This is year five of a continuing study that began in FY 1986.

Objectives:

1) Obtain an integrated set of observations of coastal surface winds, currents, and density distribution that will capture the significant forcing and mesoscale response of the coastal ocean off northern California, and

2) Analyze these data to produce a coherent picture of the dynamical nature of the mesoscale response.

Methods:

Methodology will include both *in situ* and remote sensing elements, consisting of a pilot program and 14 -month main program. There will be extensive use of current meters, and surface drifters will be deployed to provide a Lagrangian description of the velocity field. Meteorological data and sea-level data will also be collected and analyzed.

Area of Study:

San Francisco Bay, California, to the Oregon border

Products:

Progress Report, Final Reports, Draft Reports, four peer-reviewed journal articles

Justification

Importance of the Study to MMS Decisionmaking:

The Outer Continental Shelf between Cape Blanco and San Francisco Bay has been identified as an area of potentially substantial hydrocarbon resources. The southern portion of Gorda Ridge, which has been considered for critical/strategic minerals lease offering, is also located in this area.

There are, however, few physical oceanographic measurements available for this region, most of what is known having come from the California Cooperative Oceanic Fisheries Investigation Program (CalCOFI) and results of computer modeling. The Coastal Ocean Dynamics Experiment (CODE) program, funded by the National Science Foundation, has an excellent picture of shelf dynamics in the area between Point Arena and Bodega Bay, but is insufficient for describing the regional and mesoscale features of the circulation over the entire region of interest to MMS. In terms of physical oceanography, the coast between Cape Blanco and Cape Mendocino is generally accepted to be the least well understood region on the entire west coast of the United States.

A major goal of this study will be a significant increase in our understanding of the surface transport processes associated with the mesoscale eddy-like features almost always present in the satellite imagery from this region. Recent studies, such as the OPTOMA program, have shown strong "jets" (in excess of 50 cm/sec) transporting water offshore. Major questions remain as to whether or not analogous features are directed onshore and what role eddies versus mean currents play in the onshore and longshore transport of surface.

The results of this study will yield information about the spatial and temporal scales of the dominant transport processes. This information is necessary to the modeling effort.

Date Information Required and Decision Involved:

This information will be used for EIS's for future central and northern California oil and gas lease sales after 1989 and the Washington-Oregon EIS for proposed lease sale 132. It is expected that any post lease exploration or development resulting from sale 91 and subsequent sales will capitalize on this information for site-specific oil-spill analysis.

Current Status of Information on this Topic:

The MMS has been supporting three NDBC Environmental Data Buoys in this region for the past several years. The California Shelf Physical Oceanography Circulation Model has provided calculated currents for input to the oil-spill trajectory model in this area, but there have been few observations available to verify these calculations. Results of the CODE program are now being published and provide extensive information on the region between Point Reyes and Point Arena.

Applicability of Information to Issues of Regional or Programmatic Concern:

Oil-spill risk analysis is of regional and programmatic concern. The basis for this risk analysis is the prediction of probable oil trajectories. The information collected in this program will increase the credibility of those predictions.

Regional Study No.: 2

Title: Operation of West Coast Meteorological Buoy Network (continuation)

Region: Pacific

Proposed Period of Performance: FY 1990 (1 Year)

Cumulative Project Cost:

Applicable Planning Area(s): All Pacific OCS Planning Areas

Key Words: marine meteorological observations, U.S. west coast, time series, winds, temperature, pressure, waves

Description of Proposed Project

This is year 11 of a continuing study that began in FY 1980.

Objectives:

1) Obtain a record of wind conditions off the U.S. west coast of sufficient length to provide suitable input for the Oil-Spill Risk Analysis Model (OSRAM).

2) Provide accurate meteorological information (winds, air and sea temperature, humidity, etc.) for air quality modeling off the California coast.

3) Provide accurate meteorological information for ocean circulation studies being conducted along the U.S. west coast for MMS.

4) Obtain a record of wave conditions along the U.S. west coast.

Methods:

The MMS currently funds eight NOAA data buoys along the U.S. west coast. These buoys now collect surface wind information at two locations within the Washington-Oregon Planning Area and six locations along the California coast.

Area of Study:

California, Washington, and Oregon

Products:

Time series of wind speed and direction over the nearshore domain. Time series of waves and other parameters of interest. Time series of estimates of near surface atmospheric stability for use in air quality applications.

Justification

Importance of the Study to MMS Decisionmaking:

This contract is providing the only long-term time series of offshore winds from much of the California coast. The wind data have provided extremely valuable information to a variety of air quality, oil-spill, and ocean circulation studies.

Date Information Required and Decision Involved:

Information is provided for all runs of the OSRAM for all oil and gas lease sales on the west coast, and for air quality analyses for lease sales, post lease plans of exploration and plans of development.

Current Status of Information on this Topic:

This is a continuation of a study begun in FY 1980 in central and northern California and in 1981 in southern California.

Applicability of Information to Issues of Regional or Programmatic Concern:

The Department of Interior OSRAM requires a record of wind speed and direction over a period of several years. Wave conditions are an important variable which must be considered in estimating the impacts that may result if there is an oil spill.

Regional Study No.: 3

Title: Monitoring: Assessment of Long-Term Changes in Biological Communities: Phase II (continuation)

Region: Pacific

Proposed Period of Performance: FY 1986 - FY 1990 (5 Years)

Cumulative Project Cost: $9,582,044

Applicable Planning Area(s): All Pacific OCS Planning Areas

Key Words: Santa Maria Basin, monitoring, benthic communities, hydrocarbons, metals, sediments

Description of Proposed Project

This is year five of a continuing study that was originally funded in FY 1985, but the contract award was delayed until 1986.

Objectives:

1) Track the changes in representative benthic soft- and hard-bottom marine communities in the area surveyed during the Phase I reconnaissance.

2) Examine marine communities for changes associated with platform placement and operation over a period of years.

3) Correlate changes in community structure, population density species composition and diversity with changes in sediment characteristics, trace metal levels, and hydrocarbon levels in an area not previously affected by OCS activities.

4) Provide a definitive evaluation of the long-term effects of oil and gas development and production platforms on soft- and hard-bottom benthic communities on the Pacific OCS.

Methods:

The first phase of the long-term monitoring program was awarded in FY 1983 and was entitled "Monitoring: Assessment of Long-Term Changes in Biological Communities, Phase 1. Benthic Reconnaissance of the Santa Maria Basin and Western Santa Barbara Channel (Science Applications International Corporation, 1986)." The present study is Phase II of the monitoring program around oil production platforms in the Santa Maria Basin.

Predrilling sampling has been conducted for seasonal and annual variability in benthic communities at stations surrounding oil production platform Hidalgo and proposed platform Julius and at a series of regional (control) stations; sampling will continue during development (drilling) and production phases of each platform. Biological samplers include a box core, video and still photography from a Remotely Operated Vehicle (ROV) and animal traps. Other systematic measurements include sediment chemistry (metals and hydrocarbons) and oceanographic parameters (currents, temperature, salinity and nutrients). Drilling discharges will be tracked and their distribution modeled. Analysis of the data will emphasize community structure, suspected or known energy transfer within the communities and any changes associated with species composition, species-species interaction, and species population dynamics (i.e., age or size distributions and recruitment). Complementary laboratory studies include the partitioning of trace metals between the sediment-water interface and flume experiments that will evaluate settlement (i.e., potential recruitment) of representative animals within sediments that are contaminated with drilling muds.

Area of Study:

Santa Maria Basin, California

Products:

Annual Progress Reports, a Final Report and minimally six technical manuscripts to be submitted to peer-reviewed journals.

Justification

Importance of the Study to MMS Decisionmaking:

This study is part of a Long-Term Environmental Monitoring Program as recommended by a conference panel that was convened by MMS in March 1982 (U.S. Department of the Interior, 1982). The project will provide a detailed time-series that is sufficient to test hypotheses concerning changes in benthic communities resulting from either platform effects or natural environmental variability.

The 5-year period of sampling will encompass predrilling, development drilling and production activities in the Santa Maria Basin. Hence, the availability of temporal controls and the judicious inclusion of spatial controls (i.e., regional stations) should allow strong inferences to be made regarding any impacts to benthic communities that are attributable to drilling related activities.

Date Information Required and Decision Involved:

The project's First Progress Report, providing an in-depth characterization of oceanographical and biological features of the Santa Maria Basin, was available in January 1988. A definitive evaluation of drilling related effects on the Pacific OCS benthic environment will be included in the Final Report, due by late 1991. Information on the environmental characterization of the region will be applicable to OCS activities in the Southern California Planning Area; results of the Final Report will be applied to the major issue of platform drilling effects, which is shared by all Pacific OCS Planning Areas.

The Annual Progress Reports will be used by the MMS Pacific OCS Region staff in preparing postlease environmental documents for exploration/development/production plans within and near the Santa Maria Basin (Sales

48, 53, and 73 and upcoming proposed sale 95). In addition, information in the Final Report will be applicable to postlease decisions throughout the Pacific OCS, including proposed activities associated with Sales 91, 119, 128 and 132).

Current Status of Information on this Topic:

The Phase I analysis was designed to characterize benthic communities in the Santa Maria Basin; provide recommendations for locating suitable stations for long-term monitoring; determine the number of replicates needed to detect statistically significant changes in biomass, species numbers, numbers of individuals; and evaluate appropriate statistical models to base sampling and data analysis during Phase II.

Results from Phase I indicate that the soft-bottom invertebrate assemblages in the study area were similar to those previously reported near Point Conception and the Southern California bight and were distributed primarily with depth. Cluster analysis among sites showed that several species had a bimodal depth distribution, with large populations on the mainland shelf and lower slope but fewer individuals on the upper and mid slope. This distribution was only weakly correlated with measured physical parameters, suggesting that biological factors or unmeasured physical factors controlled the distributions. On hard bottoms, sediment cover appeared to be a major factor influencing biological assemblages followed by substrate relief, geographic location, and to a lesser degree depth (Science Applications International Corporation, 1986; Piltz, 1986). Brewer et al. (1987) summarized the objectives and sampling strategy of the Phase II study.

Applicability of Information to Issues of Regional or Programmatic Concern:

The results of this study, coupled with Pacific OCS studies of ocean circulation, will enhance our understanding of long-term impacts of oil and gas operations and thereby increase our ability to forecast drilling related impacts in the Pacific OCS. This study is the first comprehensive, time-extensive study of the effects of development and production platforms on the Federal OCS. It addresses the critical and repeated question of potentially subtle, long-term effects of discharges from development and production platforms (National Research Council, 1983; Boesch and Rabalais, 1987; Neff, 1987; Carney, 1987).

Regional Study No.: 4

Title: Southern California Educational Initiative (continuation)

Region: Pacific

Proposed Period of Performance: FY 1989 - FY 1993 (5 Years)

Cumulative Project Cost: $500,000

Applicable Planning Area(s): Southern California Planning Area

Key Words: cooperative agreement, educational initiative, OCS, oil and gas issues

Description of Proposed Project

This is the second year of a study that was originally funded during FY 1989 by the MMS Branch of Environmental Studies (Headquarters Office).

Objectives:

This effort is intended to implement innovative, multidisciplinary studies in an academic, peer-reviewed environment that address issues associated with the long-term development and production of oil and gas in the OCS.

Methods:

The Governor of California will nominate state academic institutions for potential participation in a 5-year cooperative agreement between MMS and the State. Responding institutions will be evaluated on their capabilities, and their identification and proposed methodology of interdisciplinary studies relating to offshore oil and gas effects on marine, coastal, and human environments. MMS will contribute a maximum of $500,000 annually, and the selected institution is expected to contribute additional matching funds. The program will be reviewed annually to determine if it is meeting the needs of MMS.

Area of Study:

Areas of existing oil and gas development and production in southern California, both onshore and offshore.

Products:

Quarterly Reports, Annual Reports, a Final Report, presentations at professional meetings and symposia, and journal publications.

Justification

Importance of the Study to MMS Decisionmaking:

Results of interdisciplinary studies related to the long-term effects of oil and gas activities that are conducted by a highly regarded academic institution are expected to enhance information being generated by other MMS studies and be used by MMS in the decisionmaking process.

Date Information Required and Decision Involved:

Information generated by the Cooperative Agreement will be used by MMS, other Federal, State, County, and City agencies as it relates to the long-term effects of offshore oil and gas activities on the environment and on socioeconomic issues. The results of the studies and analyses are expected to applied to both pre-lease and post-lease concerns throughout the Pacific OCS Region and particularly those associated with proposed Southern California Lease Sales 95 and 138.

Current Status of Information on this Topic:

The MMS Pacific OCS Region has funded over $60,000,000 in studies that contribute to our knowledge of physical, chemical, biological and socioeconomic environments off the Pacific Coast. An enormous amount of information has resulted from these efforts that has been and can be applied to decisions concerning offshore oil and gas proposals.

Applicability of Information to Issues of Regional and Programmatic Concern:

The Cooperative Agreement will draw upon the capabilities, knowledge and resourcefulness of an outstanding team of academicians, who will be expected to apply their collective talents to the identification, elucidation, and resolution of oil and gas issues.

Regional Study No.: 5

Title: Fish Assemblages of Rocky Banks of the Pacific Northwest (continuation)

Region: Pacific

Proposed Period of Performance: FY 1988 - FY 1990 (3 Years)

Cumulative Project Cost: $500,000

Applicable Planning Area(s): Washington-Oregon

Key Words: Fisheries, groundfish, habitat, hard bottom, nursery, oil and gas, Pacific OCS, rockfish, reef

Description of Proposed Project

This is year three of a study that was accelerated from FY 1989 to FY 1988. The study was originally entitled "Survey of Commercially Important Fishes in Rocky Reef Habitats off Washington and Oregon".

Objectives:

There is currently a need for more information on the habitat requirements of commercial groundfish species in Washington and Oregon. Catch data from commercial fisheries do not fully satisfy the need for this information because not all habitats and life-history stages of groundfish are accessible to trawl gear. The objective of this research is to determine the role of rocky reef areas to the production of demersal fishes. This study will provide new information on the composition, abundance, and ecology of demersal fish communities and the life history of key species. These data are needed by MMS to assess the potential effects of oil and gas development on rock bottom habitats and demersal fish communities in the Washington-Oregon Planning Area.

Methods:

1) Review available literature on the ecology of demersal fishes in rocky reef areas of the Pacific OCS offshore Washington and Oregon.

2) Select appropriate rocky reef sampling sites among Heceta, Stonewall, Perpetua, and Coquille Banks, Oregon and Cape Flattery Spit (northwest of Juan de Fuca Canyon), Washington. Emphasis will be on sites that are inaccessible to commercial fishing gear.

3) Conduct surveys along transects using manned submersibles and remotely operated vehicles (ROV's) to compare the structure of fish communities on areas that are accessible and areas that are inaccessible to trawling gear.

4) Review video tapes and still photographs from surveys to summarize fish species composition, abundance, life-history, and habitat associations.

Area of Study:

Washington and Oregon continental shelf

Products:

1) A cataloged video tape library and expanded fishery resource data base describing species composition, abundance, and life history of fishes in rocky reef habitats.

2) A final report summarizing existing literature and survey results including ecological, life-history, and distributional information for demersal species and critical habitats within the reefs.

3) A minimum of 3 manuscripts submitted to peer-reviewed journals.

Justification

Importance of the Study to MMS Decisionmaking:

Evaluation of the potential impacts of oil and gas activities on commercially important fishes in the Washington-Oregon Planning area are based in part on inventory data for rocky reef habitats. This study is intended to fill data gaps for specific reef areas particularly areas that are referenced in Sale 132 for "special presale consideration." The results will provide site specific information that can be used for detailed impact analysis for lease and postlease decisions.

Date Information Required and Decision involved:

Information derived from this study is needed to prepare future EISs for Oregon and Washington lease sales. Results would also be used in the preparation of subsequent EISs and exploration and development plans.

Current Status of Information on this Topic:

In Washington and Oregon the habitat requirements of many commercial groundfish species are poorly understood. The importance of deep offshore reefs to adult groundfish species has been inferred from abundances in commercial trawl catches on and near the reefs. Preliminary data on submersible surveys on Heceta Bank, collected during 1987 by scientists from Oregon State University, indicate that Heceta Bank is an important nursery for juvenile rockfish and that species composition and abundances of fishes are correlated with the different habitats. It has been suggested that such reefs are feeding and rearing areas for many commercial species. This research will provide new information needed to evaluate the importance of rocky reef habitats to juvenile as well as adult groundfish species.

Applicability of Information to Issues of Regional or Programmatic Concern:

Washington and Oregon have expressed concern over the lack of biological inventory data needed to adequately address environmental issues in the lease sale EIS. The State of Oregon has specifically requested deferral of

Heceta, Stonewall, Perpetua, and Coquille Banks from lease sale 132 due to their importance to commercial trawl fisheries. This survey will address information needs relating to both of these concerns. The results will provide detailed information to evaluate the potential sensitivity of these habitats to oil and gas activities.

Regional Study No.: 6

Title: California Seabird Colony Catalog (continuation)

Region: Pacific

Proposed Period of Performance: FY 1988 - FY 1990 (3 Years)

Cumulative Project Cost: $280,000

Applicable Planning Areas: Southern, Central, and Northern California

Key Words: Seabirds, nesting areas, nesting colonies, field surveys

Description of Proposed Project

This is year three of a study that was accelerated from FY 1989 to FY 1988.

Objectives:

The objective of this study is to update the MMS funded 1979 survey of California seabird colonies and publish a new edition of the California Seabird Colony Catalog (Sowles et al., 1980). This publication will provide the location, size, and species composition of seabird colonies along the California coast using surface and aerial surveys.

Methods:

Surveys will be done in a variety of ways following basic survey techniques similar to those outlined by Nettleship (1976). Counts will be made from shore and boat. Landing will be made on islands whenever possible to detect nocturnal species. Since some areas of the California coast are inaccessible, small plane and boat charters may be necessary to census areas. Investigators will study the same species as examined in the 1980 Catalog using the same format and data forms. Investigators shall make necessary arrangements to gather data from concurrent California seabird surveys such as those occurring on the Channel and Farallon Islands.

Area of Study:

Coastal California

Products:

A California Seabird Colony Catalog.

Justification

Importance of the Study to MMS decisionmaking:

As stated above, the existing data on seabird colonies for California is nearly 10 years old. Updated information is needed for the three lease sale EIS's (Sales 119, 128, and 138), which are planned for the next 5 years, and more specifically for future postlease EA's or EIS's for the California OCS.

Seabirds are vulnerable to spilled oil. Current information on the location and number of nesting seabirds is used to prepare accurate EISs. Such up-to-date data will allow the EIS analyst to better describe the nesting seabirds in an area where OCS development activities are planned and also to more accurately discuss the possible impacts that these activities may have upon the seabirds.

Date Information Required and Decision Involved:

Updated information should be available for the final EIS for Lease Sale 119, Central California, proposed for November 1990.

Current Status of Information on this Topic:

The 1980 California Seabird Colony Catalog is the current source of information on the status of nesting seabirds. Point Reyes Bird Observatory and the National Park Service monitor the status of nesting seabirds on the Farallon and Channel Islands respectively.

Applicability of Information to Issues of Regional or Programmatic Concern:

Seabirds are a highly vulnerable group of animals to spilled oil. Knowing what species are present and their numbers is important in preparing the description and impact sections of various environmental documents prepared in the Pacific OCS Region.

Regional Study No.: 7

Title: Taxonomic Atlas of the Santa Maria Basin Fauna (continuation)

Region: Pacific

Proposed Period of Performance: FY 1989 - FY 1992 (4 Years)

Cumulative Project Cost:

Applicable Planning Area(s): Southern California

Key Words: taxonomy, benthic, species, Santa Maria Basin, California

Description of Proposed Project

This is year two of a continuing study that was initiated during FY 1989.

Objectives:

Prepare a quality reference guide to the soft and hard substrate benthic fauna of the Santa Maria Basin, collected during the MMS sponsored Phase I and Phase II Long-Term Monitoring Projects, in order to insure taxonomic standardization among all benthic research in the region. This task was originally designed as component of the Phase II Program, but the study was deferred because of limited funding.

Methods:

The atlas will be divided into two parts: the first will include benthic fauna of soft bottom habitats, including black and white line illustrations and full diagnostic descriptions; the second part will include fauna of hard- bottom habitats with color photographs and full diagnostic or field characteristic descriptions.

The description of all taxa will be in a format appropriate for publication in the taxonomic literature, but shall omit full species level names of new species so as not to constitute a recognized publication or valid species taxa. It is not the intent of the MMS to publish this atlas directly under this contract, but to use it only as a reference guide for standardization among taxonomists of the region. However, the contractor will be encouraged and required to publish on material presented in the atlas; such publications shall be in the standard critically reviewed scientific literature.

Area of Study:

Santa Maria Basin and Western Santa Barbara Channel

Products:

Soft and hard substrate taxonomic atlas of benthic organisms; publications in the peer-reviewed literature.

Justification

Importance of the Study to MMS Decisionmaking:

The proper identification and classification of benthic organisms that are potentially affected by OCS oil gas activities are important elements of environmental assessment. The distribution and relative abundance of various species that occur on soft and hard substrates can be evaluated only to the extent that their specific identity (and associated morphological variability) is known. Without a standardized taxonomy, species that are rare or have limited distribution may be confused with common, widespread species. Taxonomic confusion could create needless regulatory delays; for example, a morphological variant of an abundant species could be categorized as a new, rare taxa, and thereby result in unnecessary permit restrictions for development in a particular OCS area.

In addition, monitoring and fates and effects studies (such as the long-term monitoring study being done in the Santa Maria Basin) depend upon accurate identification of marine organisms to assess changes in community structure over time and space. As sampling is extended geographically and temporally, the requirement for accurate species identification becomes more and more important for making comparisons among samples.

Date Information Required and Decision Involved:

A standardized taxonomic guide to the benthic fauna of the Santa Maria Basin and Western Santa Barbara Channel would help insure taxonomic standardization for all future biological surveys in the area, including industry sponsored efforts. This study serves primarily to support ongoing and future ecological research in this significant oil and gas activity area. Future decisions regarding lease sales and plans for development/ production would be enhanced by a better knowledge of the fauna of the area.

Current Status of Information on this Topic:

The fauna of the Santa Maria Basin and Western Santa Barbara Channel, an area of active OCS oil and gas development and production, is poorly known. Some 1,207 distinct taxa were recognized from soft bottom surveys during the MMS sponsored Phase I Monitoring Program; 229 of the taxa (19%) are undescribed in the scientific literature. Similarly, a large percentage of animals collected on rocky substrate during the Phase I survey also represented undescribed species.

Applicability of Information to Issues of Regional or Programmatic Concern:

An understanding of the changes in species composition and distribution of benthic communities associated with OCS oil and gas activities is a key element of the Phase II Long-Term Monitoring Project. Potential changes in community composition associated with production platforms are key programmatic issues nationwide. Hence, the results of the Phase II Project will have important implications for the entire Pacific Region and all other OCS regions as well. Taxonomic standardization and excellence are prerequisites to ecological understanding; MMS must know what animals are present in order to assess impacts.

Regional Study No: 8

Title: Central and Northern California Rocky Intertidal Recovery Study (continuation)

Region: Pacific

Proposed Period of Performance: FY 1983 - FY 1990 (7 years)

Cumulative Projected Cost: $1,612,995

Applicable Planning Area(s): Central California, Northern California

Key Words: California, community, disturbance, ecology, intertidal, invertebrates, oil effects, recovery, rocky, succession

Description of Proposed Project

Objectives:

1) To describe seasonal and successional long-term variation in rocky intertidal community structure.

2) To determine the response of rocky intertidal communities to natural and man-induced disturbances, and to correlate them with successional, seasonal, and latitudinal (between Point Conception, California and Oregon) variation.

3) To correlate life history information and oil toxicity data with field data obtained from the study.

4) To compare field data and conclusions of this work with data and conclusions from other relevant studies.

5) To provide background data for controlled oiling experiments or monitoring programs that may be initiated in the future.

Methods:

This project involves several subtasks some of which are complete and others which will continue throughout the project. The first sub-task involved the preparation of a report analyzing relevant literature (Foster, et. al. 1986a, 1986b) which includes an executive summary as a separate volume. An annotated bibliography (Foster, et. al. 1987) was also prepared to assist in the analyses for the above noted report.

The ongoing work focuses on a six site rocky intertidal field survey. The sites are sampled twice a year, this work will continue through 1989 or 1990. For this survey two communities, Endocladia/Mastocarpus papillatusa and Mytilus, are being sampled at each site using a point contact method at permanent plot locations. Plots were cleared either during the summer or winter, at the beginning of the study and successive field trips are conducted to monitor the recovery process. Two progress reports on the main field study have been received to date (Kinnetics Laboratories, Inc., et al., 1986 and 1987).

Area of Study:

The rocky intertidal area between Point Conception, California, and Oregon.

Products:

The products of this study include a literature analyses (Foster, et al. 1986a, 1986b), annotated bibliography (Foster, et al. 1987), a series of annual progress reports (Kinnetics Laboratories, Inc., et al. 1986, 1987) and a final report. It is also expected that this project will result in a series of published scientific papers.

Justification

Importance of the Study to MMS Decisionmaking:

This study will provide information needed to characterize the rocky intertidal communities of Central and Northern California and to determine the rates of recovery of these communities (needed for impact assessment).

Date Information Required and Decision Involved:

The information from this project will be used to prepare the draft EIS for sale 95 and all future Pacific OCS Region sales, in addition, results (as they become available; starting in September 1986) will be used to evaluate any new exploration or development plans for the region.

Current Status of Information on this Topic:

Several recovery studies have been conducted in Southern California by Littler 1977, 1978, and Murray and Littler 1978. These studies have been focused primarily on the algae and macroinvertebrates. With the exception of Cimberg (1975), similar studies in Central and Northern California, a different biogeographic province, are lacking. This study is one of the first of its kind, in the study area, and builds on the recently completed MMS study titled "Central and Northern California Coastal Marine Habitats: Oil Residence and Biological Sensitivity Indices" (Woodward-Clyde Consultants 1982a, 1982b).

Applicability of Information to Issues of Regional or Programmatic Concern:

The effect of an oil spill on a California beach is a major issue. A better understanding of recovery rates and successional processes of rocky intertidal communities will allow a more accurate assessment of the impacts that may occur to such an area from an oil spill.

Regional Study No.: 9

Title: Interannual Variability of Oceanographic Conditions and Circulation Along the Washington-Oregon Coast (continuation)

Region: Pacific

Proposed Period of Performance: FY 1989 - FY 1992 (3 Years)

Cumulative Project Cost:

Applicable Planning Area: Washington-Oregon

Key Words: physical oceanography, interannual variability, coastal circulation, northwest coast, time series, statistics

Description of Proposed Project

Objectives:

The objectives of this study are: (1) to collect the existing data base, and (2) use it to characterize, both qualitatively and quantitatively, the year to year variation in oceanographic conditions along the coast of Washington and Oregon.

Methods:

The exiting data base will be collected and stored in a single easily accessible format on a readily transportable medium, such as compact disk. The study entitled "Coastal Circulation Along Washington and Oregon" conducted by Envirosphere Company identified most of the oceanographic data collected to date in the study area.

Techniques developed as part of the "Initial Statistical Characterization of Coastal Winds and Currents" now being conducted by Greenhorne and O'Mara, Inc. are expected to be applicable to the problem of characterizing the variation seen in oceanic parameters in this study. Examples of parameters to be treated in characterizing the interannual variability are wave conditions, salinity and temperature at the surface and at depth, coastal sea level, wind conditions. Volume transport estimated from hydrographic surveys conducted along the coast are also expected to be included. If the data base is sufficient, contrasts will be drawn between various parameters as they occur during El Nino versus anti El Nino years.

Area of Study:

Canada, Washington and Oregon.

Products:

The major products will be a final report describing the results of the study and statical techniques employed. A statistical description of the interannual and shorter term variability will be produced, along with two papers suitable for publication in a peer reviewed journal.

Justification

Importance of the Study to MMS Decisionmaking:

The coast of Washington and Oregon has seen a large amount of oceanographic data already collected (see Hickey, 1979). However as was pointed out by participants at MMS sponsored workshops in early 1988, this data is neither synoptic nor uniformly distributed in time and space. It is therefore not readily conducive to analysis aimed at extracting information on interannual variation of oceanographic conditions. Understanding that variation is, however important in assessing changes in coastal circulation which would affect the fate of a potential oil spill.

This area is scheduled to be offered for lease in Sale 132, to be held in 1992. As part of the EIS process in previous lease sales MMS ran the Oil Spill Risk Analysis Model. This model accepts as one input, the results of numerical simulation of coastal ocean circulation. It is expected that prior to the writing of the Environmental Impact Statement for Lease Sale 132, the Oil Spill Risk Analysis will be run. Unlike the waters off California, no high resolution numerical modeling of the circulation has been carried out for MMS in the Washington- Oregon Planning Area.

Date Information is Required and Decisions Involved:

The significant dates are the preparation of the EIS for Sale 132 and subsequent sales. If there is sufficient industry interest and sale 132 proceeds, as indicated above, numerical modeling of the circulation in this area may be required for oil spill risk analysis model. This study will improve the accuracy of the modeling effort by providing information on mesoscale circulation features as well as the changing hydrographic conditions (used to specify boundary conditions) and winds seen in this area.

Current Status of Information on This Topic:

This study was highly recommended as one needing to be done by the workshop held as part of the coastal circulation along Washington and Oregon. Although there was not agreement on whether the determination of interannual variability would be fully successful, there was agreement that the data ought to be collected and the feasibility of the determination of interannual variability be investigated.

From the area of mid Oregon north to the Canadian border the seasonal mean flow and conditions are fairly well known. However, information is needed on how much these conditions may vary, what extremes may be expected and how the el Nino conditions change the conditions.

The Bureau of Land Management sponsored a "Summary of Knowledge for the Washington and Oregon Coastal Zone and Offshore Areas" during 1977 which contained a discussion of much the information about the physical oceanography of the region. Hickey, 1979, and in press, presents major syntheses of the exiting information on the physical oceanography of the northwest coast. A variety of other papers have dealt with specific aspects of the region: low frequency variation in currents and continental shelf waves on the Oregon shelf (Cutchin and Smith, 1973; Huyer, et al., 1975; Kundu and Allan, 1976;

Hsieh, 1982), the "Spring Transition" (Huyer, et al., 1979), El Nino events (Huyer and Smith, 1985). The exiting data base if compiled into a convenient format would support a wide variety of additional investigations.

Applicability of the Information to Issues of Regional or Programmatic Concern:

The Washington-Oregon Planning Area constitutes a major unknown in the future of the OCS Oil and Gas Leasing program. The views expressed by state agencies indicate a concern with environmental issues as great as anywhere in the country. Both the scientific investigator's workshop held in Seattle in February 1988 and the Public Workshop held in Portland in May of 1988 emphasized the need for additional environmental studies, including physical oceanography. Near the top of the list of recommendations was the compilation and analysis of the existing data base.

Regional Study No.: 10

Title: Reasonably Available Control Technology (RACT) Determination for the Pacific OCS

Region: Pacific

Priority Ranking: A1B1

Proposed Period of Performance: FY 1990 (1 Year)

Cumulative Project Cost:

Applicable Planning Area(s): Southern California

Key Words: RACT, installation costs, operation & maintenance costs, control strategies

Description of Proposed Project

Objectives:

1) Develop a detailed inventory by OCS facility of equipment and processes emitting air pollutants. The information contained shall include, but not be limited to, equipment type, manufacturer model number, type and amount of fuel used, cost of installation, and operation and maintenance (O&M) costs.

2) For each facility, develop an escalating series of control strategies to reduce air emissions. The strategies should concentrate on reducing NOx, VOC, particulate matter and to a lesser degree SOx emissions.

3) Establish the costs associated with each control strategy given in (2).

Methods:

The detailed equipment inventory would be obtained by contacting operators, contacting MMS personnel at the District Offices, and visits to OCS facilities. The control strategy development would result from the study contractor's experience and from consultation of federal (EPA), state (CARB), and local (APCDs) regulatory agencies. Cost information would be gathered by contacting a representative sampling of vendors.

Area of Study:

Southern California OCS facilities

Products:

1) A detailed equipment inventory by OCS facility including fuel use, installation costs, and O&M costs.

2) An escalating series of control strategies (including retrofit costs and O&M costs) breakdown for each facility.

Justification

Importance of the Study to MMS Decisionmaking:

The information will be used to meet a requirement in the proposed new air quality rule for the California OCS. The pertinent requirement in the proposed rule states the following:

> "All existing facilities shall be required to install OCS RACT (Reasonably Available Control Technology) within 3 years of the promulgation of this rule."

The RACT determination will be made by the Regional Director on a facility-by-facility basis taking into account economic considerations primarily. Theoretically, retrofit costs could make a facility uneconomical forcing a shutdown and a loss of government revenue.

Date Information Required and Decision Involved:

It would be preferable to have the information shortly after the effective date of the rule. It is strongly desireable to have the information 2 years after the effective date of the rule since retrofit decisions must be made within 3 years. See above for the decision involved.

Current Status of Information on this Topic:

Detailed equipment inventory exists for only a couple of platforms; however the information is not in a usable format. There is no in-house information on installation and O&M costs. MMS needs more detailed information on potential control strategies for existing facilities.

Applicability of Information to Issues of Regional or Programmatic Concern:

The information provided by this study is needed for the RD's decision to implement RACT on existing facilities. The RD's decision on this issue will be scrutinized by the State and local regulatory agencies.

Regional Study No.: 11

Title: A Summary and Database of Washington-Oregon Coastal Ecology

Region: Pacific Priority Ranking: A2B1

Proposed Period of Performance: FY 1990 - FY 1991 (2 Years)

Cumulative Project Cost:

Applicable Planning Area(s): Washington-Oregon

Key Words: Oregon, Washington, coastal zone, biota, habitats, species, resources, characterization, inventory, database, mapping, graphics, GIS

Description of Proposed Project

Objectives:

The overall goal is the compilation of a comprehensive source of information on the existing environmental conditions and marine resources of the Oregon-Washington coastal zone that is easily accessed and updated through an integrated computer database and graphical (mapping) system. A hard copy bibliography and review/synthesis volume would be interim products. The main thrust of the project is the development of an interactive, dynamic computerized system for information management and graphical display that may be frequently updated.

The project would provide MMS, the States of Washington and Oregon and interested users with:

1) A comprehensive literature review and synthesis of information on physical, chemical and biological characteristics of the coastal zone and OCS, including descriptions of important habitats, species and communities. This effort would update the 1977 "Summary of Knowledge" (Oceanographic Institute of Washington, 1977).

2) A description of those habitats, species or communities, that by nature of their susceptibility, sensitivity or location, are potentially most vulnerable to OCS oil and gas activities and associated impacting agents, including oil spills, routine platform discharges, pipelines and marine terminals.

3) Easy access to the above environmental and resource information through an integrated database/graphical (mapping) display system that a) relies on existing, available microcomputer hardware and software, b) is easily updated and expanded as new information becomes available, c) is easily transferred or transported to other computer systems, and d) is compatible with other Geographic Information Systems (GIS). The key objective is a dynamic, interactive microcomputer-based system that is readily available to interested users and is not dependent upon a mainframe computer.

Methods:

1) Published and unpublished papers, technical reports, data reports and verifiable raw data that deal with physical, chemical and biological aspects of the Oregon and Washington coastal zone would be compiled. Information sources would include, but not be limited to, federal and state government agencies, academic institutions and on-line computer information and bibliographic services.

2) Information and data would be reviewed by discipline experts, who would then catalog and format all appropriate material for preparation of the required bibliography, the review/synthesis report and for entry into the computer database/graphics system.

3) Bibliographic entries would be formatted using the MS-DOS (literature database) software called SCIMATE, which would provide compatibility with existing MMS Pacific OCS Region bibliographies, and provide easy updating via commercial, on-line computer bibliographic services.

4) The review/synthesis report, while comprehensive in scope, would be limited to 100 pages of text, excluding tables and figures. The report would be structured using a habitat approach rather than a phylogenetic approach. Existing knowledge of the physical, chemical and biological aspects of estuarine, sandy beach, rocky beach, and shallow subtidal habitats would be summarized. Emphasis would be given to economically and/or ecologically important species that occur within the major habitats. Interactions among abiotic and biotic components, and basic ecosystem processes would be discussed. Data gaps would be explained.

5) The development of a flexible, dynamic database/graphics capability for accessing and updating environmental information is the most important aspect of the proposed methodology. Additional MMS review and a planned workshop (before contract award), would be convened to discuss computer hardware and software features and availability, including GIS specifications and compatibility among Federal and State (Washington, Oregon and California) agencies and users.

6) The overall project would progress in a step-wise manner. The literature database, bibliography and review/synthesis report would be completed the first year. The interactive database/graphics capability would be initiated during the Year I, and any appropriate, GIS compatible, environmental data, including digitized charts of the Oregon-Washington coast that are available from Federal or State agencies, would be entered. Habitat and species mapping of the coastal zone would have high priority. During Year II, all additional, relevant databases (identified during Year I) would be reformatted to the GIS system. New environmental databases that become available after Year II would be incorporated into the ever evolving, up-to-date system. Data for offshore Oregon-Washington and ultimately, data specific to California OCS Planning Areas would be added to the database as dictated by future information needs and data availability.

Area of Study:

The Washington and Oregon coastal zone.

Products:

1) A hard copy bibliography and computer database of marine environmental literature on the Washington-Oregon coastal zone.

2) A review/synthesis/characterization of the Oregon-Washington coastal zone, emphasizing important habitats, species and communities, and especially those potentially influenced by anticipated OCS oil and gas exploration, development and production activities.

3) A dynamic computer database/graphical system for accessing and updating the compiled environmental information that would evolve and grow as new data became available.

Justification

Importance of the Study to MMS Decisionmaking:

A review and synthesis of environmental information is needed by the MMS Pacific OCS Region to evaluate coastal resources and prepare impact analyses for the Washington-Oregon Planning Area. Existing recent information on important habitats and species is not readily accessible to MMS analysts. The study will identify data gaps and help the Environmental Studies Program plan for future studies, as needed.

From a broader perspective, it is appropriate that the MMS Environmental Studies Program develop a supplement to the production of lengthy technical documents that involve distribution, abundance or concentration parameters (e.g., for animals and sediment chemistry). The proposed study will enhance MMS decisionmaking by improving the accessibility of information acquired by MMS or other Federal, State or academic institutions, and by providing a mechanism for keeping environmental information current and available.

Date Information Required and Decision Involved:

Lease Sale 132, scheduled for April 1992, will require the preparation of draft and final Environmental Impact Statements (EISs) during 1991. The environmental assessment process, associated with EIS preparation, requires a knowledge of existing environmental conditions and characteristics of the Oregon-Washington coastal zone. Improved information management and accessibility will help ensure that both prelease and postlease documents and decisionmaking will be improved and enhanced.

Current Status of Information on this Topic:

A large amount of environmental information and data on the Washington-Oregon coastal zone has accumulated since the MMS sponsored "Summary of Knowledge" was released in 1977. The "Oregon Ocean Book" (1985) provides a useful overview of coastal resources off Oregon. NOAA sponsored a coastal habitat mapping project (1988) that produced large format, color maps of the Washington-Oregon coast. Unfortunately, the distribution of the NOAA map-set has been very limited because of high reproduction costs. Data collected by NOAA for the preparation of the maps should be available and incorporated into the proposed database/graphics system.

Based on the MMS sponsored 1988 "Conference/Workshop on Recommendations for Studies in Washington and Oregon Relative to Offshore Oil and Gas Development," it is clear that existing environmental information on the Washington-Oregon coastal zone has not been adequately compiled and summarized in formats that are available or useful to MMS. A literature review and summary (including mapping) of important species and habitats off Washington and Oregon was given high priority as a study recommendation by participants of the marine ecology workshop at the 1988 Conference.

GIS based systems (defined as a computer hardware and software system designed to collect, manage, manipulate, analyze and display spatially referenced data) are used extensively by agencies of the Department of Interior (including MMS, BLM, OSM, FWS, NPS, BIA, BM, BOR and USGS). NOAA's Strategic Assessment Branch has developed a Computer Mapping and Analysis System (CMAS) that uses Apple MacIntosh hardware to display marine resource data. CMAS now includes a "West Coast Living Marine Resources" map series that contains spatial and temporal distributions of 46 marine species. NOAA plans to add new data sets to CMAS on invertebrates, fishes and environmental quality of the West Coast of North America. It is appropriate that the MMS Environmental Studies Section, in partnership with the affected coastal States and other Federal agencies make use of existing computer mapping and GIS technology to better manage the growth and availability of environmental information.

Applicability of Information to Issues of Regional or Programmatic Concern:

The Washington-Oregon Planning Area is considered a frontier area for potential oil and gas development. As such, background information on environmental conditions must be gathered and synthesized during the prelease phase into formats that are useful to MMS analysts and decisionmakers and representatives from the affected States. An area-wide characterization that uses existing information and identifies data gaps is an appropriate first step in the prelease environmental assessment process.

Regional Studies No.: 12

Title: Information Transfer Meeting

Region: Pacific

Priority Ranking: A2B1

Proposed Period of Performance: FY 1990 - FY 1993 (4 Years)

Cumulative Project Cost:

Applicable Planning Area: All Pacific OCS Planning Areas

Key Words: Environmental Studies Program, meeting, conference, study results

Description of Proposed Project

Objectives:

To provide a forum for the exchange of information and ideas among public, private, governmental, scientific, and industrial sectors about research on the Outer Continental Shelf offshore California, Washington, and Oregon that is being conducted by MMS and others.

Methods:

The project would provide funds for the planning and coordination of 3 Information Transfer Meetings (ITMs) to be held during 1991, 1992, and 1993, including meeting advertising, meeting logistics, and publication of proceedings volumes.

Topics for each of the 3-day meetings would include physical oceanography and meteorology; air quality; fates, effects and chemistry; biology and ecology; endangered species; social and economics. Speakers would be invited to prepare 20-minute oral presentations, and each presentation would be followed by a 10-minute question and answer period.

Area of Study:

Coastal and offshore areas of California, Washington, and Oregon.

Products:

A conference proceedings would be published following each ITM.

Justification

Importance of the Study to MMS Decisionmaking:

MMS is responsible for providing information needed for the prediction, assessment and management of impacts from OCS oil and gas activities. Much of this information is developed through the MMS Environmental Studies Program, which has funded more than $60 million worth of applied research in the Pacific OCS Region since 1973. Other information, relevant to MMS decisionmaking, is generated by other Federal and State agencies, academia and the oil and gas industry. The ITM is an effective and timely forum for bringing together persons who develop and use information about the OCS.

Date Information is Required and Decisions Involved:

The ITM is not designed to address specific prelease or postlease decisions, per se. However, since MMS Environmental Studies contractors are required or encouraged to present preliminary or final results of their studies (which have relevance to specific decisions) at the ITM, the meetings provide MMS analysts with information that can be applied to various prelease and postlease documents.

Current Status of Information on This Topic:

Previous ITMs, sponsored by the Pacific OCS Region, were held in December 1984 (Santa Barbara), December 1985 (Culver City) and May 1987 (San Francisco). Attendance at the meetings ranged from 114 to 225 persons, who heard formal presentations from 24 to 30 speakers on topics that encompassed physical, biological and human environments of the Pacific coast.

Applicability of the Information to Issues of Regional or Programmatic Concern:

The ITM is a method of keeping MMS analysts and decisionmakers up-to-date about recent and ongoing research on coastal and offshore areas of the Pacific coast. ITMs provide MMS and the public with information that may be applied to information needs well before formal publication. By encouraging investigators from other agencies and academia to attend and present papers, MMS learns about other non-MMS research that may be applied to MMS decisions, and MMS can avoid duplication of studies effort.

Regional Study No.: 13

Title: Reestablishment and Recovery of OCS Hard Substrate Communities

Region: Pacific Priority Ranking: A2B1

Proposed Period of Performance: FY 1990 - FY 1994 (5 Years)

Cumulative Project Cost:

Applicable Planning Area(s): All Pacific Planning Areas

Key Words: OCS, oil and gas, benthic communities, hard substrate, hard bottom, reestablishment, recruitment, recovery, recolonization, succession, growth, disturbance, ROV

Description of Proposed Project

Objectives:

Localized disturbance to deepwater benthic communities results from certain activities associated with OCS oil and gas development. Disturbance of both soft substrate or hard substrate communities may be caused by mechanical damage from anchors and anchor chain during the installation of drilling rigs, platforms and pipelines (Lissner 1988). Concerns include 1) the ability of established deepwater benthic communities to recover and grow following a disturbance, 2) the duration of the recovery period. These concerns are consequential for hard substrate communities on the Pacific OCS because such habitat is uncommon, and because hard-substrate communities include many taxa that are believed to be slow growing and long-lived (Lissner 1988). Short-term recovery of benthic habitats was addressed, in part, by Bane (1979) as part of a limited reconnaissance (following exploratory activities) on the shallow Tanner and Cortes Banks.

The purpose of the proposed experimental field study is to evaluate how long it takes Pacific OCS hard bottom communities to become recolonized and reestablished following a mechanical disturbance, and also to determine what influence platform discharges may have on their ability to recover. Following Boesch et al. (1977) (as cited by Lissner 1988) recovery is considered complete when "the community in a disturbed area exhibits variation that is within the range of variation seen in communities from undisturbed, control areas."

Methods:

Prior to the development of a Request for Proposals (RFP), a public workshop may be held to discuss study feasibility and experimental designs. The following discussion would be used as the basis for comments and recommendations.

Recolonization experiments would be conducted in areas previously sampled in the Santa Maria Basin or Santa Barbara Channel where oil and gas activities have not occurred. In particular, sampling conducted as part of Phase I of the long-term monitoring effort (Science Applications International Corporation) should be useful in locating an appropriate area for study.

Although an experimental protocol could be established by creating clearings (i.e., mechanical disturbances) on existing rock features by dragging anchor chains and weights across the bottom, more rigorous experimental control would be achieved by submerging artificial substrate on, and adjacent to, existing rock features that surround Platform Hidalgo.

A factorial experiment is proposed that would measure colonization, succession and growth on artificial substrates (rocks) that are placed on and among several rocky features that are adjacent to Platform Hidalgo. A Remotely Operated Vehicle (ROV) would be used to ensure the appropriate placement of the artificial substrate and to collect subsequent photographs for quantitative analysis of recruitment, community structure and growth. Experimental and control sites would be sampled photographically by ROV semiannually during Years I and II and annually during Years III-V.

Formal hypotheses testing (including a prior tests using ANOVA and regression, and a posteriori tests using clustering, ordination) would assess variability in species/communities as related to colonization and growth on artificial hard substrate as influenced by 1) adjacent hard substrate community type, 2) bottom depth, 3) height of relief, 4) distance from rocky features, 5) proximity to the platform and the platform muds/cuttings discharge plume. Data from the ongoing California Monitoring study (CAMP) would be used to establish replication criteria, species/assemblages for study, and to identify experimental and control sites.

A second approach might be an opportunistic study of an exploratory drilling operation. The aerial extent of impact from anchors and anchor chains would be determined by repeated sampling of the area to determine the initial disturbance and subsequent recovery.

Area of Study:

Previously sampled areas in the Santa Barbara Channel or Santa Maria Basin, California.

Products:

Interim reports will be required after year one and year three, a final report during year five, and a minimum of three manuscripts will be submitted to referred journals.

Justification

Importance of the Study to MMS Decisionmaking:

All offshore hard substrate species and communities are considered uncommon or rare, and as such, disturbance to any OCS rocky habitat by anchoring activities or muds and cuttings discharges is a significant concern to MMS as well as to Federal and State resource agencies. Certain taxa such as vase sponges and corals may be particularly vulnerable to impact because they are long-lived, slow growing and/or especially sensitive to sedimentation.

Better information on the ability of hard substrate communities to recolonize and recover from anchor scaring, and to tolerate increased rates of sedimentation, would improve decisionmaking associated with plans of exploration, plans of development, pipeline rights-of-way.

Date Information Required and Decision Involved:

Results of the study would be available in interim reports as early as 1991, and would be used to guide decisionmakers concerning proposed well locations and anchoring patterns related to plans of exploration, plans of development and pipeline permits throughout the Pacific OCS. Preliminary data would also be available for assessment and impact analysis associated with NEPA documents, including EISs for Lease Sale 128 (February 1992), 132 (April 1992) and 138 (June 1992).

Current Status of Information on this Topic:

The literature is replete with studies on colonization, recovery, succession and growth of intertidal and shallow subtidal communities, but these data can not be extrapolated or generalized to the different species and conditions that occur in OCS waters.

The CAMP study is evaluating the effects of platform discharges on established benthic communities (Hyland and Neff 1988). The proposed study would complement and supplement the information being gathered by CAMP.

The report "Review of Recovery and Recolonization of Hard Substrate Communities of the Outer Continental Shelf" (Lissner 1988) was an interim deliverable of the MMS contract entitled "Biological Reconnaissance of Selected Benthic Habitats within Three California OCS Planning Areas." The report reviewed all available literature and drew upon intertidal and shallow subtidal studies to suggest that the primary factors that influence recovery and recolonization include 1) the type and size of the disturbed area; 2) temporal fluctuations in the abundance of larvae that can serve as recolonizers; 3) water movement, including boundary layer flow, currents and storm surge; 4) the selectivity of larvae for substratum characteristics; 5) biological interactions occurring among organisms colonizing patches; and 6) frequency of disturbances of the habitat. The report concluded that while relatively little information on these six factors was available for deep water hard substrate communities, testable hypotheses could be applied to generalized ecological models of inhibition, facilitation and tolerance to gain better insight into the sensitivities of hard bottom organisms.

Applicability of Information to Issues of Regional or Programmatic Concern:

Disturbance of benthic habitat by any of several OCS oil and gas activities is a major concern region-wide and nationwide. The Pacific Region requires more information on the ability of deep water species and communities to either tolerate or adapt and recover from natural or anthropogenic changes associated with mechanical, chemical or sedimentological agents or events. This study would improve MMS's information on how biological communities respond to both natural and manmade disturbances in order to appropriately and realistically assign significance levels to anticipated impacts from activities on the OCS.

Regional Study No.: 14

Title: Northern California Coastal Aerometric Monitoring Program

Region: Pacific   Priority Ranking: A2B3

Proposed Period of Performance: FY 1989 - FY 1990 (2 Years)

Cumulative Project Cost:

Applicable Planning Area(s): Northern California

Key Words: air quality monitoring, meteorological monitoring, photochemical modeling, ozone

Description of Proposed Project

Objectives:

The purpose of this study is to obtain the necessary air quality and meteorological data for use in photochemical modeling of offshore emission sources in the Northern California Planning Area. The objectives of the study are to acquire knowledge concerning ambient background levels of pollutants, information on wind circulation patterns and atmospheric dispersion conditions, knowledge about meteorological conditions as they affect pollutant levels, and to obtain data that can be used in photochemical models for determining impacts of offshore oil and gas development on onshore ozone levels.

Methods:

Information will be collected through a network of meteorological and air quality monitoring stations. Monitoring will take place for about a 6-month period starting about May 1990 and ending in November 1990. The stations will measure basic parameters such as wind direction and speed, temperature, and relative humidity. Two meteorological buoys will be placed offshore to collect data on wind direction and speed, and air and sea surface temperature. Data from two existing NDBC buoys, which are being funded under a separate MMS contract, will also be incorporated. Wind and temperature profile data will be obtained using doppler acoustic wind sounders. In addition, vertical temperature and humidity profiles will be obtained by twice daily radiosonde observations.

Air quality measurements at the stations will be made to obtain 1-hour average concentrations of ozone, nitric oxide, nitrogen dioxide, total hydrocarbons, and reactive organic gases. In addition, at some sites, air samples will be collected at specified intervals to obtain information on hydrocarbon speciation. Integrated samples will be obtained at several station sites using automatic sampling systems, and at other sites grab samples will be collected manually.

The data will be analyzed to determine the nature of transport and dispersion of air pollutants in the area, the chemistry of air pollutants found in the area, and the relationship between meteorological factors and ozone concentrations. Meteorological conditions that have the potential for ozone generation will be identified. Parameters will be identified that may be used in photochemical modeling.

Area of Study:

The area of study will consist of the coastal area in Humboldt County between Trinidad Head and Cape Mendocino, and the coastal area in Mendocino County between Fort Bragg and Point Arena.

Products:

A report will be prepared that summarizes the study observations. It will describe meteorological and air quality characteristics of the area that are crucial in terms of evaluating effects of emissions on ozone levels, and it will present scenarios that can be used as input to photochemical models. In addition, a data archive will be prepared for use in photochemical modeling for estimating impacts from offshore exploratory drilling activities and development and production projects.

Justification

Importance of the Study to MMS Decisionmaking:

There is currently an inadequate data base for grid type modeling of effects of offshore oil and gas activities on ozone in the Northern California Planning Area. This limits the ability of MMS to review plans of exploration and plans of development/production by the lessee in the study area. Assumptions that have to be used in the absence of data tend to generate controversy and are likely to result in delays in approval of projects. An improved database will result in greater credibility in using models to predict effects of these projects on ozone.

Two types of models can be used in photochemical impact evaluations: a trajectory model (e.g., TRACE) and a grid model (e.g., PARIS). The grid model is a more advanced model and requires a more substantial database than a trajectory model. For applications on the OCS, the use of a grid type model appears to be favored by the agencies because it is more accurate, provided an adequate database exists. However, information generated in this study will help improve assessments using trajectory models as well.

Date Information Required and Decision Involved:

Proposed OCS Lease Sale 91 has been postponed indefinitely based on President Bush's announcement. The lease sale's future status will be reviewed by a Presidential OCS Task Force over the next year.

Current Status of Information on this Topic:

The availability of meteorological and air quality data in the area is limited. Surface wind data are available from Arcata Airport. Two offshore NDBC buoys have been collecting meteorological data in the northern

California area since 1982. There is limited information on vertical temperature profiles in the area. Historical air quality data primarily consist of measurements of particulates. There is no current information on nitrogen oxides and ozone.

The Humboldt and Mendocino County Air Pollution Control Districts are initiating an air quality monitoring program in late 1987 or early 1988 to obtain baseline data (Swan, 1987). This consists of a 2-year program where a mobile unit will obtain 1 year of data at two different locations. The station will obtain data on ozone, nitrogen dioxide, sulfur dioxide, and carbon monoxide. Wind direction and wind speed will also be obtained. A similar program will be undertaken by Humboldt County. This program will provide much needed background data for use in air quality impact analyses, but application of these data is more suitable for modeling inert pollutants.

There will still be need for additional data, however, that can be applied specifically to photochemical modeling. This includes additional ambient air quality data, additional offshore meteorological data, information on wind and temperature profiles, and hydrocarbon speciation samples.

An aerometric monitoring plan for obtaining data for photochemical modeling in the South Central Air Basin in California (SCCCAMP) is described by Dabberdt et al. (1985). Elements in this plan will be incorporated in this proposed study. However, the amount of detail applied in the SCCCAMP monitoring plan is not appropriate to the north coast area because of the much lower air pollutant levels there.

Applicability of Information to Issues of Regional or Programmatic Concern:

Air quality is one of the primary issues related to OCS development in the Pacific OCS Region. An adequate database is crucial in the resolution of issues related to air quality. Because of geographic similarities, results of this study may also be of value to some areas off central California as well as Washington and Oregon.

Regional Study No.: 15

Title: Air Quality Modeling for OCS Lease Sales Nos. 128, 132, and 138

Region: Pacific Priority Ranking: A2B3

Proposed Period of Performance: FY 1990 - FY 1991 (2 Years)

Cumulative Project Cost:

Applicable Planning Areas: Washington-Oregon, Northern California, Southern California

Key Words: air quality modeling, atmospheric pollutants

Description of Proposed Project

Objectives:

1) Prepare emission inventories for certain hypothetical scenarios associated with OCS Lease Sales Nos. 128, 132, and 138.

2) Compile available air quality and meteorological data needed to perform an air quality impact assessment of OCS development in the proposed sale areas.

3) Perform air quality modeling analyses to determine air quality impacts resulting from the proposed lease sales.

4) Determine compliance of project with federal and State ambient air quality standards and with Department of Interior air quality regulations. Determine possible effects on compliance schedule for non-attainment areas.

5) Assess cumulative impacts from the proposed lease sale in combination with production activities on existing OCS leases in the sale area.

6) Examine potential mitigation measures to reduce air quality impacts.

7) Prepare, a technical report to support air quality impact analyses in EISs for Lease Sales 128, 132, and 138.

Methods:

Air emission inventories will be prepared for various development scenarios. The emission sources will consist of OCS exploration, development, and production activities, including support vessels, tankers, and onshore oil and gas processing facilities. The inventory will include all criteria pollutants. Model input parameters will be obtained from the offshore meteorological buoys and from coastal meteorological stations. The OCD model will be used to calculate impacts from inert pollutants.

The modeling analysis will consider a combination of different size facilities and distances from shore. Effects of alternative transportation scenarios (i.e., tankers, pipelines) will be evaluated.

A modeling analysis will also include effects from toxic pollutants. A qualitative discussion of possible effects on acid deposition and visibility will also be made.

Area of Study:

Northern California, southern California, Washington and Oregon

Products:

Three separate technical reports presenting methods and results of the air quality analysis for each proposed lease sale.

Justification

Importance of the Study to MMS Decisionmaking:

The information is needed to provide technical information for the lease sale EISs.

Date Information Required and Decision Involved:

Information is needed prior to preparation of the Draft EIS for Lease Sales 128, 132, and 138. Tentative publication dates for the draft EIS are as follows:

Sale 128 draft EIS	January 1991
Sale 132 draft EIS	March 1991
Sale 138 draft EIS	May 1991

Modeling for the Sale 128 DEIS needs to be initiated about July 1990.

Current Status of Information on this Topic:

Air quality modeling has been performed for Northern California (Lease Sales 53 and 91), Central California (Lease Sale 53), and for Southern California (Lease Sales 48, 68, 73, and 80). Modeling is currently underway for Lease Sale 95 (Southern California), while modeling for Sale 119 (Central California) will be initiated in FY 1989. Modeling techniques, methods of compiling emission inventories, and quality of the data base have gradually improved over the years. New modeling is needed for those areas, however, because of changes in existing OCS sources, and changes in future predicted development in each of the Planning Areas. This is due to the development of the OCD model and the increasing amount of data available from the meteorological buoys. Knowledge concerning emission factors, operating parameters, and control technologies have also greatly improved.

Photochemical modeling to predict impacts from ozone has been done primarily using trajectory models. The accuracy and reliability of this type of model have been criticized however, and there is an increased trend among regulatory agencies to abandon trajectory modeling in favor of a grid model such as AIRSHED. However, the use of a grid model on the scale of a lease sale area is very costly and time consuming and such an approach can best be pursued through a cooperative study with the appropriate local regulatory agencies. This study will therefore not include a detailed ozone modeling effort.

This study will provide a much more detailed treatment of toxics than previous modeling studies. There is no available model to assess effects of acid deposition. This study will therefore only provide a qualitative analysis of the problem.

Applicability of Information to Issues of Regional or Programmatic Concern:

This information will be important to decisions made with respect to the leasing process, and the determination of possible air quality stipulations. Because air quality is a very sensitive issue, and receives considerable scrutiny by the regulatory agencies and the public, it is imperative to perform a technically defensible analysis. Study results will primarily pertain to the specific Planning Areas. However, some of the information generated such as emission parameters would be applicable to other OCS Regions as well.

Regional Study No.: 16

Title: Ocean Transport Processes Operating Between the Santa Barbara Channel and the Santa Maria Basin

Region: Pacific

Priority Ranking: A3B1

Proposed Period of Performance: FY 1990 - FY 1991 (2 Years)

Cumulative Projected Cost:

Applicable Planning Area: Southern California

Key Words: pollutant transport, currents, physical oceanography, Santa Barbara Channel, Point Conception, Santa Maria Basin, bottom transport, satellite imagery, drifters, current meters

Description of Proposed Project

Objectives:

The objective of this study is to characterize qualitatively (and to the degree possible, quantitatively) the transport of possible pollutants between the Santa Barbara Channel and the Santa Maria Basin both at the surface and at depth.

Methods:

The dynamics controlling volume transport will be investigated and described qualitatively. The feasibility of quantitative measures of such transport will be investigated and if warranted, such measures will be developed. Pressure and sea level measurements, along with current meter and satellite data collected during the Central California Coastal Circulation Study (CCCCS) and the Santa Barbara Channel Circulation Model and Field Study in 1984, as well similar data collected during the Opus Program in 1983, along with drifter tracks and wind observations from the above studies will be used to determine driving forces, and the major response modes of the flow in the region surrounding Point Conception. Where appropriate, modeling results from the California Shelf Model and the Santa Barbara Channel model will be used augment the observational database in the development of a detailed three dimensional conceptual model of the flow between the Santa Maria Basin and the Santa Barbara Channel.

There will be no new field work undertaken. This work will follow up on that by Brink and Muench (1986), Barth and Brink (1987), and Lagerloef and Bernstein (1988). The study will integrate data already collected by the above indicated programs and provide a conceptional model of what relative roles are played by local and remote wind forcing and by local and large scale pressure gradients in driving the flow around Point Conception. Based on this conceptual model and observations already collected, it should be possible to develop useful quantitative estimates of the volume exchange which takes place between the two regions of interest.

To the maximum extent practical, several specific oil and gas activity scenarios will be provided by MMS to the contractor and analyzed by the contractor with regard to transport processes which could move discharges from the area of the activity.

Area of Study:

Santa Barbara Channel, Point Conception, and the Santa Maria Basin. Data from more distant areas will be included as necessary.

Products:

The major product will be a final report describing the dynamics of the flow, major forcing mechanisms and response modes for the Point Conception region and the resulting volume transport between the Santa Barbara Channel and the Santa Maria Basin. In addition, a paper describing the results of the study will be submitted to a peer reviewed technical journal.

Justification

Importance of the Study to MMS Decisionmaking:

The Santa Barbara Channel has been developed for oil and gas over the last thirty years. The Santa Maria Basin is now undergoing major development. Additional development is expected to occur around Point Conception in the next several years. There is concern regarding possible changes in the ecology of the region due to the long term cumulative effects produced by multiple discharges of pollutants such as drilling muds and cuttings, formation water discharges, and any accidental oil spills which might occur.

Phase II of the California Monitoring Program (CAMP) is currently underway and addressing many issues regarding that concern. The monitoring program however will not be able to fully answer significant questions regarding circulation in the area. There is now however a body of data which is sufficient to support an additional analysis effort to further clarify the complex circulation in this area.

The recent sinking of the bulk carrier PacBaroness with the associated spillage of oil and copper ore makes this study even more valuable. There is now information on oil slick movement in this region and great interest in the movement of the copper ore on the bottom. The ability to make any reasonably informed prediction of the movement this material will require increased understanding of the deep flow around Point Conception.

A recent ruling by the California Coastal Commission denying a permit for the discharge of drilling muds and cuttings at sea was justified by observations at a single current meter mooring (a part of the OPUS program) which was in place for only a period of several weeks. Because this was the only observational data available near the site in question and there was little in the way of a conceptual model of the circulation in the area to refute the conclusion based on the extremely limited observational data, the permit was denied. A better understanding of the flow in this area would have permitted a decision based on an improved picture of the likelihood of onshore transport of such material.

Date Information is Required and Decisions Involved:

The significant dates are the end of the monitoring program and the development of leases in the Santa Maria Basin which are expected to take place over the next ten years at least. The improved understanding of the circulation in this region will permit more reliable interpretation of the results of the monitoring program and support better postlease decisions regarding development issues, including EPA permits for platform discharges.

Current Status of Information on This Topic:

There is little information on the transport between the Santa Barbara Channel and the Santa Maria Basin. The OPUS program collected an excellent data set in the Point Conception area and the two MMS programs (the CCCCS and the Santa Barbara Channel Circulation Model and Field Study) provided information on the physical oceanography of the two regions. The MMS programs were in the water during calendar year 1984 and provide an excellent picture of what was happening on either side of Point Conception during this time.

Some significant conclusions of the CCCCS study were that the flow in the Santa Maria Basin (between Point Conception and Point Buchon) is "fundamentally different" from the flow farther north; that it has a pronounced and persistent onshore component; that the "currents both on the shelf and off the shelf near Point Conception were statistically unrelated to local wind forcing", and that "poleward propagation (of wavelike disturbances) was not important in explaining Point Sal current variability." These findings warrant further investigation in light of the need to understand the circulation in this critical area.

The circulation within the Santa Barbara Channel is known to be dominated by a gyre which frequently occupies the western part of the channel. There is also a jet like current which flows westward along the northern boundary of the channel. (This was well documented by the Santa Barbara Channel Circulation Model and Field Study.) It is not known how much of the water exiting the Santa Barbara Channel is entrained in the flow northward into the Santa Maria Basin. (This northward flow on the upper slope and shelf in the Santa Maria Basin was one of the significant findings of the CCCCS study). In addition to the paper of Chelton et al. (1987), two papers dealing with the circulation in this region have recently been published: Brink and Muench (1986) Barth and Brink (1987).

Applicability of the Information to Issues of Regional or Programmatic Concern:

The Santa Maria Basin is a major frontier area which will undergo additional development in the years ahead. Oil spill models and other studies which will be conducted in the area will also benefit from this study. The CCCCS has documented a persistent onshore component of the flow in the Santa Maria Basin. This may be a direct result of the flow exiting the Santa Barbara Channel.

Regional Study No.: 17

Title: Assessment of Methods of PM-10 and Visibility Modeling

Region: Pacific Priority Ranking: A3B2

Proposed Period of Performance: FY 1990 - FY 1991 (2 Years)

Cumulative Project Cost:

Applicable Planning Areas: All Pacific OCS Planning Areas

Key Words: air quality modeling, chemical transformations, secondary particulates, PM-10, visibility

Description of Proposed Project

Objectives:

1) Perform literature survey to summarize current knowledge about formation of secondary particulate matter (i.e., sulfates, nitrates) from sources of gaseous pollutants, especially in a marine environment.

2) Summarize current knowledge about aerosol formation and visibility within the marine boundary layer offshore California.

3) Survey adequacy of current PM-10 modeling techniques in accounting for formation of secondary particulates.

4) Develop guidelines, methods, or techniques for predicting PM-10 and visibility impacts from OCS emission sources.

Methods:

A literature study will be performed to gather information on current knowledge obtained through observations and theory about formation of secondary particulate matter resulting from chemical transformation of gaseous pollutants. The primary particulates of concern will be those resulting from emissions of sulfur oxides and nitrogen oxides. The effects of different environments (such as rural, marine, and urban) shall be examined. Observed rates of secondary particle formation shall be examined. Another literature study will be conducted to examine current knowledge about aerosol formation and visibility within the marine boundary layer off the California coast.

Based on the information gathered in the literature survey, a range of chemical transformation rates for the different pollutants shall be determined, and the degree of uncertainty will be ascertained.

Various existing models will be examined to determine their adequacy in describing PM-10 formation from gaseous pollutants. The adequacy of existing visibility screening models will also be examined.

Finally, recommendations will be made on modeling PM-10 and visibility as applied to OCS facilities. This may consist of guidelines, conversion factors, mathematical formulae, or simple screening algorithms. Recommendations may include modifying an existing model such as OCD to account for PM-10 formation. However, this study will not include development or modification of computer codes.

Area of Study:

This study will apply primarily to the California, Washington, and Oregon coastal areas.

Products:

A technical report will be produced that summarizes the literature survey about secondary particulate formation. The report will also include an evaluation of the adequacy of existing PM-10 models. Finally, the report will include a set of recommendations regarding PM-10 and visibility models.

Justification

Importance of the Study to MMS Decisionmaking:

The chemical transformation of gaseous pollutants to fine particulate matter may be an important contributor to PM-10 in the atmosphere. There is presently no model available for predicting PM-10 for regulatory applications. Screening tools recommended by the California Air Resources Board appears to be excessively conservative and may be based on questionable assumptions. There is a need to summarize existing knowledge and to evaluate techniques in light of this knowledge. Scientifically based guidelines need to be developed that MMS can use in regulatory applications.

The question of PM-10 is important because in many areas in California the federal standard is exceeded, while in most areas the State standard is exceeded. PM-10 may have human health consequences and also affects visibility.

Date Information Required and Decision Involved:

Information is needed to update guidelines for air quality modeling. These guidelines are prepared in cooperation with the California Air Resources Board. These guidelines need revision whenever significant new information becomes available. Present guidelines do not treat the question of secondary particulate formation in calculating PM-10. It is important that this information become available as soon as possible.

The information will be used in impact analyses for pre-lease EISs as well as for regulatory decisions involving plans of exploration and plans of development/production.

Current Status of Information on this Topic:

There is a considerable amount of information in the literature on secondary particulate formation. However, there is no summarization of all the data.

There is also little guidance available on how to treat secondary particle formation in regulatory air quality models. Screening techniques are greatly oversimplified and may significantly over predict impacts.

Applicability of Information to Issues of Regional or Programmatic Concern:

Air quality will continue to be one of the major items of concern in the Pacific Region. The issue of PM-10 may have significant regulatory implications.

Regional Study No.: 18

Title: Social and Economic Changes Related to Oil and Gas Development in Washington-Oregon

Region: Pacific   Priority Ranking: A3B2

Proposed Period of Performance: FY 1990 (1 Year)

Cumulative Project Cost:

Applicable Planning Area(s): Washington-Oregon

Key Words: socioeconomics, infrastructure, cultural issues

Description of Proposed Project

Objectives:

1) To obtain a better understanding of how social and economic structures of coastal communities in the Washington and Oregon coastal area might be affected by offshore oil and gas development.

2) To evaluate the coastal areas, ability and willingness to respond to social and economic changes.

3) To predict the potential effects of oil and gas leasing and development on the well-being and quality of life of the local population.

4) To assess the potential impacts of oil and gas development on existing economic resources and the social and political organizations of coastal communities and tribes.

Methods:

Use existing social and economic models to assess impacts from oil and gas development on the coastal tribes and communities. Relate industry location needs to State and local policies and laws in terms of the coastal zone management program and the availability of onshore infrastructure.

Area of Study:

Coastal sites adjacent to Sale 132 and other appropriate sites.

Products:

Progress and final reports.

Justification

Importance of the Study to MMS Decisionmaking

Lease Sale 132 is scheduled for April 1992. There is little current support industry or associated infrastructure for offshore oil and gas development.

The local communities and Indian tribes depend on tourism, timber, and commercial fishing for their livelihood. Unemployment is high in the off season. This study is required to show the changes in the social and economic structures of the coastal communities and Indian tribes, their social and political organizations, and current social and economic issues. This information is necessary to understand and predict the ways in which the communities and Indian tribes will be affected by offshore oil and gas development.

Date Information Required and Decision Involved:

The results of this study will be used in prelease and postlease EISs for Sale 132, plans of exploration and development and in industry location decisions related to oil and gas facilities.

Current Status of Information on this Topic:

Data from the baseline socioeconomic study for the Washington-Oregon area will be utilized in the proposed study. This study will complement the ongoing study entitled "Potential Social and Economic Effects of OCS Oil and Gas Activities on Oregon and Washington Indian Tribes."

Applicability of Information to Issues of Regional or Programmatic Concern:

The methodology derived from a previous study for northern California (Site Specific Analysis Study) will be applicable to this study.

Regional Study No.: 19

Title: Aerometric Data Collection for Recent Lease Sales (or Proposed Lease Sales

Region: Pacific Priority Ranking: A3B2

Proposed Period of Performance: FY 1990 - FY 1992 (3 years)

Cumulative Project Cost:

Applicable Planning Area(s): Selected Lease Sale Areas

Key Words: aerometric data, meteorology, air quality, modeling

Description of Proposed Project

Objectives:

Collection of aerometric (air quality and meteorology) data necessary to perform acceptable modeling for expected air quality impacts from development of new lease sale acreage in order to overcome unrealistic worst case assumption modeling and its attendant restrictions which is undertaken in the absence of accurate input data.

Methods:

Data would be collected by establishing and operating a data gathering program to collect at least the minimally necessary data to run an air quality model for the area of concern.

Area of Study:

Selected lease sale areas.

Products:

A data base for use in adequate modeling of air quality impacts from new or recent lease sale area development.

Justification

Importance of the Study to MMS Decisionmaking:

Data are required for modeling the potential air quality impacts of OCS activities.

Date Information Required and Decision Involved:

At the time of lease sale planning or immediately after a lease sale.

Current Status of Information on this Topic:

Good data exists for lease sales in the Santa Barbara Channel. Otherwise there is very little data.

Applicability of Information to Issues of Regional or Programmatic Concern:

See "Importance of the Study" above.

Regional Study No.: 20

Title: Risk Assessment of Sour Gas Production and Transportation

Region: Pacific Priority Ranking: A3B2

Proposed Period of Performance: FY 1990 (1 Year)

Cumulative Project Cost:

Applicable Planning Area(s): All Pacific OCS Planning Areas

Key Words: H_2S, hydrogen sulfide, sour gas, risk, production, transportation

Description of Proposed Project

Objectives:

1) Determine the risk of producing and transporting sour gas (H_2S, hydrogen sulfide).

2) Model the hazard footprints that one might expect as a reasonable worse case if a sour gas pipeline were to leak. Detail what factors might affect the parameters of the footprint.

3) Determine the costs and benefits of various risk-reducing measures, including removal of H_2S on the platform before shipping to an onshore facility, minimizing length of onshore segments of sour gas, and improved monitoring and leak detection for H_2S.

Methods:

Arthur D. Little, Inc. has developed a methodology for modeling risks of sour gas transportation and processing. Additionally, a number of methodologies have been developed for modeling dispersion of toxic clouds.

Area of Study:

Southern California coastal and offshore areas.

Products:

A draft and final report.

Justification

Importance of the Study to MMS Decisionmaking:

Transportation of sour gas and oil from OCS production areas are a concern to public health and safety agencies. Among the potential measures that might eliminate or reduce such risks is the removal of H_2S on the platform so that gas sent onshore for processing is not toxic. If such a measure is a viable mitigation, it might influence future permitting of oil and gas development projects. Other concerns include pipeline routing that minimizes public exposure to potential pipeline leaks, and improved monitoring and warning systems to detect H_2S leaks.

Date Information Required and Decision Involved:

Prior to commencing an EIS for another oil and gas project in the OCS.

Current Status of Information on this Topic:

Santa Barbara County currently is conducting a Supplemental Environmental Impact Report (SEIR) to assess the risk of transporting sour gas from the OCS Point Arguello Project to onshore processing facilities at Gaviota. The original EIS/EIR for this project assessed hazards of sour gas transportation and processing with much lower concentrations of H_2S. Higher concentrations were later discovered, necessitating the need for the SEIR. The SEIR is expected to be completed in August of this year. Also, the County is conducting a siting study for gas processing sites in Southern San Luis Obispo County and Northern Santa Barbara County. Transportation of sour gas has become a paramount issue in this study. For completed studies, see past EIS/EIRs as well as publication no. M-10 published by the California Division of Oil and Gas.

Applicability of Information to Issues of Regional or Programmatic Concern:

Preliminary research into the hazards of producing, transporting, and processing sour gas and oil from OCS hydrocarbon areas can be most helpful in determining associated level of risks and identifying the effectiveness of various risk-reducing measures. The results of this study will be most helpful to future project-specific EIS/EIRs for proposed OCS Oil and Gas Projects.

Regional Study No.: 21

Title: Dynamics of Circulation in the Very Nearshore Domain

Region: Pacific Priority Ranking: A3B2

Proposed Period of Performance: FY 1990 - FY 1993 (4 Years)

Cumulative Project Cost:

Applicable Planning Area: Washington-Oregon

Key Words: physical oceanography, meteorology, circulation, topographic effects, cross shelf transport, mesoscale, waves, tides, boundary layers, surf zone

Description of Proposed Project

Objectives:

The objective is to describe the dynamics controlling the circulation in the very near shore (0 to 50 m).

Methods:

Measurements of physical variables (mass, velocity) in the water column. The influence of tides and waves as well as currents in deeper water will be investigated. Current meters, wave riders, a variety of drifters, and other techniques such as CODAR will be considered. The field work for this study will be conducted in two seasons, winter (severe wave conditions) and summer and (moderate wave conditions).

The first phase of this study will be a planning phase. It will include a workshop to bring together scientists from academia, government (including MMS) and industry to design an experiment to meet the needs of MMS.

Area of Study:

Southern Oregon, off the coast of Florence

Products:

The products will be a final report describing the results of the study, four peer reviewed papers. Also we will have increased the data base available for use in numerical modeling for oil spill risk assessment, and for linkage to exiting MMS models such as the "SMEAR" model developed for the Alaska Region.

Justification

There is very little know of the dynamics which operate in this domain. Most of the oil spill containment and clean up occurs in this domain.

Importance of the Study to MMS Decisionmaking:

Decisions regarding oil spill contingency plans require information on conditions in this domain. Coulpling of circulation models with "SMEAR" type models also require information on the dynamics in the nearshore zone.

Date Information is Required and Decisions Involved:

Information is needed for all lease sale EISs along the west coast.

Current Status of Information on This Topic:

Little information regarding circulation dynamics in the nearshore zone exists.

Applicability of the Information to Issues of Regional or Programmatic Concern:

Coupling of models is perhaps the most general concern.

Regional Studies No.: 22

Title: Heceta Bank Circulation Study

Region: Pacific   Priority Ranking: A3B2

Proposed Period of Performance: FY 1990 - FY 1993 (4 Years)

Cumulative Project Cost:

Applicable Planning Area: Washington-Oregon

Key Words: physical oceanography, meteorology, circulation, topographic effects, Columbia River plume, cross shelf transport, mesoscale, tidal rectification, bottom boundary layer

Description of Proposed Project

Objectives:

The objective is to examine and describe the circulation occurring over Heceta Bank and its impact on circulation to the south ("down stream").

Methods:

Measurements of physical variables (mass, velocity) in the water column. The surface wind field will be mapped provide a high resolution description. Coordinated use of drifters, Acoustic Doppler Current Profilers (ADCPs), and satellite imagery will be helpful in describing the influence of the banks on circulation down steam. Extensive measurements of velocity in the bottom boundary layer will be made. The influence of the tides on the circulation in the vicinity will be determined. The field work for this study will be conducted in the summer and the winter.

Area of Study:

General area of Heceta Bank, off the coast of Oregon

Products:

The products will be a final report describing the results of the study, three peer reviewed papers, a conceptual model of the nature of the fronts associated with the Columbia River Plume in the summer. Also we will have increased the data base available for use in numerical modeling for oil spill risk assessment.

Justification

There is virtually no observational data on circulation from this region. It is known that wave conditions are more sever in the offshore (such as in the area of Heceta Bank) than in the nearshore. Bottom boundary layer measurements will be made to provide estimates of sediment transport conditions over the Bank.

Importance of the Study to MMS Decisionmaking:

Heceta Bank is a prime fishing area, and as such is of concern to both MMS and the public. Fisheries studies funded by MMS are already underway here.

Date Information is Required and Decisions Involved:

Information would be valuable for all subsequent lease sales in the Oregon and Washington Planning Area.

Current Status of Information on This Topic:

Little information exists.

Applicability of the Information to Issues of Regional or Programmatic Concern:

Information collected would support interpretation of biological studies conducted in the area. It would also be directly applicable to the assessment of possible pollutant trajectories.

Regional Study No.: 23

Title: Reconnaissance of Offshore Sediment Chemistry

Region: Pacific

Priority Ranking: A3B2

Proposed Period of Performance: FY 1990 - FY 1991 (2 Years)

Cumulative Project Cost:

Applicable Planning Area(s): Washington-Oregon, Northern and Central California

Key Words: Washington, Oregon, California, offshore, OCS, sediments, chemistry,`hydrocarbons, metals, contaminants

Description of Proposed Project

Objectives:

1) To collect and analyze sediment samples for selected hydrocarbons and metals at representative sites offshore Washington, Oregon, Northern California and Central California to determine prelease environmental conditions and variability in areas potentially influenced by OCS oil and gas development.

2) To compile and review all available sediment chemistry data that has been collected along the coasts of Washington, Oregon and California for reformatting (as necessary) and input into the proposed Pacific OCS Region's "Marine Resources Database," an information management-database and graphical display (Geographic Information System or GIS) system. (see FY 1990 study entitled "Marine Resources of the Oregon-Washington Coastal Zone: A Database for Today and Tomorrow.")

3) To prepare a comprehensive, yet concise synthesis of the variability, trends and patterns of sediment hydrocarbons and metals along the entire Pacific coast.

Methods:

1) Sediment samples would be collected at stations along onshore-offshore transects, with sites selected on the basis of proximity to potential oil and gas activity and the absence of existing baseline data. A total of approximately 20-25 transects, with 4-5 stations per transect would be surveyed during a single reconnaissance cruise. Sampling depths would range from 50 to 500 meters.

2) A teflon coated sediment corer/grab and clean shipboard techniques would be used to collect sediment samples for analysis of total organic carbon (TOC), grain size, selected hydrocarbons (total alkanes, low molecular weight alkanes, total alkenes, pristane, phytane, naphthalenes, dibenzothiophenes, phenanthrenes, fluorenes 4,5-ring polycyclic aromatic hydrocarbons and total polycyclic aromatic hydrocarbons) and selected metals (barium, chromium, zinc, arsenic, lead, mercury, copper, and vanadium).

3) Results would be evaluated on the basis onshore-offshore trends, geographical patterns and proximity to know sources of anthropogenic contaminants. Results would be compared and contrasted with existing sediment chemistry data from coastal and offshore waters throughout the Pacific coast.

4) Data on sediment chemistry, collected during the survey and from other existing sources, would be formatted for direct input into the proposed Pacific OCS Region's "Marine Resources Database."

Area of Study: Waters offshore Washington, Oregon, northern California and central California

Products:

Draft and Final Reports would be available within 15 and 18 months of contract award, respectively. Data summary tables, graphical displays and mapping of sediment chemistry parameters associated with the proposed "Marine Resources Database" would be available on a long-term, up-to-date basis. A least one manuscript would be submitted to a peer-reviewed journal.

Justification

Importance of the Study to MMS Decisionmaking:

Informed environmental assessments and impact analyses require a knowledge of natural or baseline environmental conditions and variability. Existing levels of sediment hydrocarbons and metals, viewed on a regional basis, provide the MMS analyst with the necessary perspective for evaluating and describing any anticipated, localized increase in sediment contamination that may be associated with oil and gas development.

Although it can be argued (for example, based past studies off southern California) that existing levels of sediment metals and hydrocarbons are highly variable and that a single, low-level baseline concentration probably does not exist, (even in frontier areas) such knowledge is important; it enables the analyst to describe what levels of anthropogenic input may be detectable, given the background variability.

Date Information Required and Decision Involved:

Information collected during the proposed survey would be available, at the earliest, by the first-quarter of 1991 and hence, would be available for prelease environmental characterizations and assessments for proposed Lease Sales 128 (February 1992), and 132 (April 1992). Since an objective of the study is a compilation, review and synthesis of all existing sediment chemistry work along the Pacific coast, the information developed would be applied to all future assessments and determinations that are associated with oil and gas activity along the entire Pacific coast.

Given the current lease sale schedule, the proposed effort could be staged according to information priorities by planning area; however, the project as proposed, provides a cost effective and timely approach toward information needs that will ultimately encompass the entire Pacific OCS.

Current Status of Information on this Topic:

Data on sediment hydrocarbons and metals in coastal and offshore sediments is extensive for the southern California area, but are spotty and incomplete for most of the Pacific coast. Existing data sources include MMS (BLM) southern California baseline surveys, MMS's existing long-term monitoring project in the Santa Maria Basin. From central California northward, data are limited to localized, project-specific surveys or monitoring conducted by city and county municipal dischargers, the Corps of Engineers and the Environmental Protection Agency.

Applicability of Information to Issues of Regional or Programmatic Concern:

A recommendation for a baseline reconnaissance of sediment hydrocarbons and metals was made by participants of the "Fates and Effects Workshop" at the recent "Conference on Recommendations for Studies in Oregon-Washington Relative to Offshore Oil and Gas Development." The potential for sediment contamination from exploratory, development and production-associated discharges is a regional and programmatic issue. It is important for MMS to develop data on pre-impact concentrations of chemical contaminants and their variability so that any potential or actual increase in contaminate levels that result from oil and gas activities can be evaluated and placed in proper perspective.

Regional Study No.: 24

Title: Physical and Biological Dynamics of the Neuston and Microlayer

Region: Pacific Priority Ranking: A3B2

Proposed Period of Performance: FY 1990 (1 Year)

Cumulative Project Cost:

Applicable Planning Area(s): All Pacific OCS Planning Areas

Key Words: neuston, microlayer, oil spill, ichthyoplankton, fish larvae, crab larvae

Description of Proposed Project

Objectives:

The near-surface layer of Pacific continental shelf waters is an obligatory habitat for many marine organisms. The young of commercially important flatfish and crabs spend several days to several months feeding and growing within the upper millimeter (microlayer) to several centimeters (neuston) of the ocean's surface. Other animals migrate from deeper depths or alight on the surface to feed on a rich planktonic community that is found at the air/sea interface. In addition to an abundance of plants and animals, the surface layer may also accumulate hydrocarbons, metals, and particulate matter in relatively high concentrations. While individual biotic and abiotic components of the surface waters have been studied, the interactions of the various components and the potential susceptibility of sensitive life-history stages to surface contaminants have not been reviewed.

The objective of this proposed study is a review of published and unpublished information on (1) the young of commercially important fishes and invertebrates that occur actively or passively in near-surface (to 1 meter depth) waters of the Pacific coast, and (2) their potential interaction, in time and space, with near-surface hydrocarbons, metals, and particulate materials that are a direct, indirect, or accidental result of Pacific outer continental shelf (OCS) oil and gas activities.

Methods:

The proposed effort requires the compilation, review and synthesis of published and unpublished reports and publications on the biological and physical characteristics and dynamics of Pacific coast near-surface waters, including the chemistry, fate, and effects of hydrocarbons, metals and particulate materials that may actually or potentially occur therein.

Area of Study:

The Pacific continental shelf and existing literature from sources worldwide.

Products:

Draft and final reports and at least one manuscript submitted to a peer-reviewed journal.

Justification

Importance of the Study to MMS Decisionmaking:

Impacts from oil spills and other contaminants that are potential consequences of OCS oil and gas activities generate more public interest and concern than any other oil and gas issue. A review and analysis of information on the potential effects on the planktonic young of commercially and ecologically important species, is needed by MMS analysts to adequately respond to these issues in environmental planning documents and at public hearings and meetings.

Date Information Required and Decision Involved:

The information is needed to address ongoing concerns that were expressed recently during scoping for the 5-Year Environmental Impact Statement (EIS) (U.S. Department of the Interior, 1987b) and by comments on the draft EIS for Lease Sale 91. All upcoming oil and gas prelease and postlease environmental documents in the Pacific OCS Region must address questions about hydrocarbon and metal contaminants and their effects on marine life.

Current Status of Information on this Topic:

The physical, chemical and biological nature of the air/sea interface are sufficiently different from subsurface waters that the ocean's surface layer has been regarded as a distinct ecological assemblage (Hardy and States, (1986; Hardy et a., 1986)). Much of the information on near-surface dwelling organisms for the Pacific coast is in National Marine Fisheries Service and California Cooperative Oceanic Fisheries Investigations (CalCOFI) data reports or technical reports, and hence, not in a format that is accessible or usable by MMS.

An abundant literature is available on the fate of crude oil in the sea and the effects of soluble crude oil components on a variety of marine organisms (National Academy of Sciences, 1985). Fates and effects of drilling particulate discharges (muds and cuttings) have been recently reviewed (Boesch and Rabalais, 1987). Organisms such as the planktonic eggs and larvae of cod, sole, flounder, hake, anchovy, crab and lobster may be exposed to much higher concentrations of soluble and insoluble hydrocarbon fractions in surface waters compared to deeper-living organisms. These creatures may not have the swimming ability to avoid surface contaminants, and moreover, they are likely to remain just below a surface slick, driven by the same wind-driven currents that transport the near-surface waters.

Organisms such as the larvae of northern anchovy, _Engraulis mordax_, which undergo diel vertical migrations to the sea surface to gulp air (Hunter and Sanchez, 1976) may be particularly vulnerable to direct contact with floating oil or surface contaminants.

Applicability of Information to Issues of Regional or Programmatic Concern:

The need for a review on the topic of neuston and microlayer dynamics was emphasized by participants at the recent "Conference/Workshop on Recommendations for Studies in Washington and Oregon Relative to Offshore Oil and Gas Development", held May 23-25, 1988 in Portland, Oregon. Informal recommendations to conduct neuston and microlayer studies came from both the fisheries and marine ecology workshops.

MMS is aware of the argument that losses of eggs and larvae are not significant because their mortality from anthropogenic causes can not be measured against the background of natural mortality. Although it may not be possible to model or evaluate the significance of any losses of the eggs and larvae of fish and shellfish to adult populations, this study is useful because near-surface dwelling organisms are key ecological resources in themselves, not just what they might become after surviving to adulthood.

Regional Study No.: 25

Title: Dynamics Associated with Oceanic Fronts and the Inshore Boundary of the Columbia River Plume

Region: Pacific Priority Ranking: A3B2

Proposed Period of Performance: FY 1990 - FY 1992 (3 Years)

Cumulative Project Cost:

Applicable Planning Area: Washington-Oregon

Key Words: physical oceanography, meteorology, oceanic fronts, Columbia River plume, cross shelf transport, optical properties, mesoscale

Description of Proposed Project

Objectives:

The objective is to examine the nature of, and dynamical processes which control oceanic fronts, and which in turn may act to accumulate pollutants as well as plankton and associated predator species.

Methods:

Measurements of physical variables (mass, velocity) in the water column. The surface wind field will be mapped provide a high resolution description of the wind forcing. Coordinated use of drifters, Acoustic Doppler Current Profilers (ADCPs), and satellite imagery on a small scale domain will permit an accurate three dimensional description of the features of interest. It may be appropriate to use CODAR for surface current mapping. The field work for this study will be conducted in the summer of the second year of the contract. A limited amount of biological, chemical, and optical sampling will be conducted. There will be a large scale domain to be sparsely sampled and a smaller sub-domain to be intensively sampled.

Area of Study:

Coast of Oregon

Products:

The products will be a final report describing the results of the study, three peer reviewed papers, a conceptual model of the nature of the fronts associated with the Columbia River Plume in the summer. Also we will have increased the data base available for use in numerical modeling for oil spill risk assessment.

Justification

Importance of the Study to MMS Decisionmaking:

The results of this study will be important for assessing potential impacts from possible discharges from OCS oil and gas activities. Decisions about timing of possible discharges or conditions for discharge depths, etc., relay on an understanding of general and specific concentrating processes which can operate at ocean frontal boundaries.

Date Information is Required and Decisions Involved:

This information would be applied in a general impact assessment to OCS lease sales in the Washington-Oregon Planning Area and for postlease environmental documents associated with any future oil and gas exploration and development.

Current Status of Information on This Topic:

The ONR funded Coastal Transition Zone program currently in progress off Northern California will provide a starting point for this study. The MMS funded Seabird Ecology Study demonstrated that seabirds can make use of differing optical properties which are associated with fronts in searching for food.

Applicability of the Information to Issues of Regional or Programmatic Concern:

This information will be valuable in the assessment and prediction of possible pollutant trajectories.

Regional Study No.: 26

Title: Coastal Circulation Near Cape Blanco

Region: Pacific

Priority Ranking: A3B2

Proposed Period of Performance: FY 1990 - FY 1993 (4 Years)

Cumulative Project Cost:

Applicable Planning Area: Washington-Oregon

Key Words: physical oceanography, meteorology, circulation, topographic effects, cross shelf transport, mesoscale

Description of Proposed Project

Objectives:

The objective is to describe the coastal circulation between Florence, Oregon and Eureka, California.

Methods:

Measurements of currents and hydrography will be made between the 50 to 500 m isobaths. The surface wind field will be mapped provide a high resolution description. The study will involve coordinated use of drifters, Acoustic Doppler Current Profilers (ADCPs), and satellite imagery. The field work for this study will be conducted in two seasons, winter and summer.

Area of Study:

Coasts of southern Oregon and northern California.

Products:

The products will be a final report describing the results of the study and four peer reviewed papers. Also we will have increased the data base available for use in numerical modeling for oil spill risk assessment.

Justification

There is very little observational data in this area. From satellite imagery it is apparent that Cape Blanco is a topographic feature which provides major cross shelf forcing to the circulation in this area.

Importance of the Study to MMS Decisionmaking:

This area remains largely unknown in terms of physical oceanographic conditions. This domain may be an important transitional area between the California Shelf and the Washington-Oregon Shelf.

Date Information is Required and Decisions Involved:

Information will be valuable for Sale 132 EIS and all subsequent EISs in the Washington-Oregon Planning Area.

Current Status of Information on This Topic:

Very little is known about conditions in this area.

Applicability of the Information to Issues of Regional or Programmatic Concern:

This information will be valuable in the assessment and prediction of possible pollutant trajectories.

Regional Study No.: 27

Title: Estuary/Coastal Ocean Exchange Processes

Region: Pacific

Priority Ranking: A3B3

Proposed Period of Performance: FY 1990 - FY 1993 (4 Years)

Cumulative Project Cost:

Applicable Planning Area: Washington-Oregon

Key Words: physical oceanography, trace metal chemistry, nutrient chemistry, estuarine dynamics, northwest coast, Columbia River plume, pollutant transport, sediment transport

Description of Proposed Project

Objectives:

The objective is to examine the transport processes by which thermodynamic variables (determining mass and volume), nutrients and pollutants are exchanged between the coastal ocean and an estuary.

Methods:

Measurements of physical variables (mass, velocity) in the water column, atmosphere, and at the sea bed will be made to determine the nature and dominate scales of the advective processes taking place. Extensive sampling of nutrient chemistry will be done both in the estuary and in the nearby coastal ocean. Trace metals or other substances (such as radioactive substances which may mark the Columbia River Plume) which may act as water mass tracers will be sought and if possible used to track water entering and exiting the estuary.

Limited biological sampling will be conducted to ascertain the relative roles of the estuary and the coastal ocean in the life history of various species.

Area of Study:

Tillamook, Oregon north to Moclips, Washington.

Products:

The products will be a final report describing the results of the study, five peer reviewed papers, a baseline data set describing the physical, biological and chemical makeup of the estuary and surrounding coastal ocean.

Justification

Importance of the Study to MMS Decisionmaking:

Contamination of the estuaries on the Washington-Oregon coast by OCS oil development related discharges and possible oil spills is a major concern to state and local agencies. This fact was emphasized most recently at the public workshop for studies recommendations held in Portland, Oregon in May 1988.

Recent research has demonstrated that pollutants entering **from the coastal ocean may concentrate in estuaries.** (Science News 133:23, June 4, 1988.) It thus appears that the estuary is a two way conduit of various pollutants, those contributed from the land side as well as those contributed from the coastal ocean.

Date Information is Required and Decisions Involved:

The information would be used in post-lease analyses siting of platforms in the study area.

Current Status of Information on This Topic:

Although much is known about estuarine dynamics, little is known about the processes controlling the exchange of substances between the estuary and the surrounding coastal ocean.

Within the study area, the Columbia River estuary has been extensively studied, and that data should be of interest.

Applicability of the Information to Issues of Regional or Programmatic Concern:

The estuaries in the planning area typically are used or transited by several species of game fish at some point in their life cycle. Shell fish and crustaceans also are dependent on estuaries for their habitat or as a nursery. Migratory water fowl are also dependent on the wetlands associated with estuaries. Oil spills constitute a potent threat to an estuary. At this point there is little evidence to support the contention that routine discharges from oil rigs would pose a threat to any nearby estuary. However, there is substantial public concern regarding this.

Regional Study No.: 28

Title: Coastal Supplementation of the Oregon and Washington Air Quality Monitoring Network

Region: Pacific

Priority Ranking: A3B3

Proposed Period of Performance: FY 1990 - FY 1994 (5 Years)

Cumulative Project Cost:

Applicable Planning Area(s): Washington-Oregon

Key Words: air quality monitoring, Oregon, Washington, sulfur dioxide (SO2), nitrogen dioxide (NO2), ozone (O3), hydrocarbons (HC), and PM-10

Description of Proposed Project

Objectives:

Provide background air quality data for impact assessment and photochemical modeling.

Methods:

A limited number of monitoring sites (one in each state) would be chosen to the mutual satisfaction of the MMS and Washington/Oregon. Washington Department of Ecology (DOE) and Oregon Department of Environmental Quality (DEQ) would install, operate, and maintain the air quality monitoring stations and MMS would reimburse them for time and expenses. The stations would sample the following pollutants: SO_2, NO_2, O_3, hydrocarbons (HC), and PM-10.

Area of Study:

Washington and Oregon coastal zone

Products:

1) Air quality data would be reported in the respective annual air quality report.

2) The quality assured, raw data would be provided to MMS on some type of computer media (i.e., diskettes or magnetic tapes).

3) Quality Assurance/Quality Control report would be provided with the data.

Justification

Importance of the Study to MMS Decisionmaking:

MMS is required by law to compare OCS impacts to significance criteria, to Prevention of Significant Deterioration (PSD) increments, and to ambient air quality standards (AAQS). To compare OCS facility impacts to AAQS one needs to first of all estimate the incremental impact caused by the facility emissions and then add the increment to a representative background concentration. Finally, the total concentrations are compared to the relevant standard. Without background concentrations, the MMS must assume a worst-case background concentration, and therefore impacts tend to be overstated.

Also to perform photochemical modeling background NOx and HC data are needed or worst-case conditions must be assumed. Thus impacts are overestimated.

Date Information Required and Decision Involved:

The information would be helpful for developing the EIS for Lease Sale No. 132. It is more important that it is available for exploration drilling permits.

Current Status of Information on this Topic:

The attached map shows the available air quality data in coastal Washington and Oregon. In Washington there is limited particulate and SO2 data and in Oregon there is in only particulate data.

Applicability of Information to Issues of Regional or Programmatic Concern:

Air quality is one of the primary issues related to OCS development in the Pacific Region. An adequate data base is crucial in the resolution of issues related to air quality such as, estimating the cumulative air quality effects from OCS oil and gas development and acquiring the necessary input data to photochemical models for impact assessment. Lack of meteorological and air quality data in the coastal environment is an issue of concern for the States of Oregon and Washington (see the Proceedings of the Conference/Workshop. Recommendation for Studies in Washington and Oregon Relative to Offshore Oil and Gas Development).

Regional Study No.: 29

Title: Effects of Oil Fouling on Harbor Seal Pups

Region: Pacific

Priority Ranking: A3B3

Proposed Period of Performance: FY 1990 (1 Year)

Cumulative Project Cost:

Applicable Planning Area: All Pacific Planning Areas

Key Words: Harbor seal, oil effects

Description of Proposed Project

Objectives:

1) Determine the effects of oil fouling on harbor seal (Phoca vitulina) pups, including:

What are the effects of oil contact on pup physiology?
What are the effects of oil contact on pup behavior?
What are the pathological effects of oil contact and is oil lethal to harbor seal pups?

2) Determine if oil effects (especially thermoregulatory effects) vary with pup age, including:

Is there a critical age at which harbor seal pups are especially vulnerable to oil contact?

3) Determine if pup oiling interferes with mother/pup behavioral interactions, including:
Does oil fouling of pups interfere with the ability of mothers to locate their pups (females identify their pups by smell)?
Does oil fouling of pups inhibit parental care (e.g., nursing, grooming, etc.)?

Methods:

Conduct a controlled study of the effects of oil on either free ranging or captive harbor seal pups with particular attention given to thermoregulatory changes. The study should include the application of crude oil to various aged pups and subsequent monitoring of pup physiology and behavior until either death or apparent recovery occurs. Physiological monitoring should primarily include body temperature measurements but also blood chemistry. If a pup or pups die during the experiment, a pathological study will be conducted to determine cause of death and any apparent pathological changes resulting from oil contact. For free ranging pups, the study should include observations on the behaviors associated with parental care before and after oil application and an assessment of any differences that might be attributable to the oiling.

Area of Study:

Coastal Washington and Oregon

Products:

The major product from this study will be a final report and one peer reviewed journal article describing the results and implications of the research.

Justification

Importance of the Study to MMS Decisionmaking:

The potential for harbor seal pup mortality from contact with oil has been raised as an issue in MMS EISs, and the results of such a study will be used to clarify the significance of this issue for application in MMS documents.

Most adult pinnipeds (except possibly fur seals) are protected from exposure by a thick layer of blubber, and oil contact is not expected to result in mortality. However, there is some concern over the potential lethal effects of oil fouling on the pups of some pinniped species which may rely more on fur for protection from cold prior to the development of a sufficiently thick blubber layer. Harbor seal pups may be especially vulnerable to oil contact because. 1) they are occasionally born with a white lanugo coat, 2) they are sometimes born in water (harbor seals can swim immediately after birth), 3) they are usually born in situations where they are more frequently covered with water than the pups of some species, and 4) lactation may take place in water. Thus, harbor seal pups may rely more on fur for thermoregulation and they may come into contact with an oil spill at a much earlier age than other species such as elephant seal pups. Harbor seals are also an excellent candidate for such a study because the information gained can apply to OCS operations in both the Pacific and Atlantic regions since the species is widely distributed in both oceans. The study results could also potentially be applied to other species that are believed to be less vulnerable to oil contact (e.g. sea lions).

Date Information is Required and Decisions Involved:

This information will assist MMS personnel in the preparation of all future EISs beginning with the Sale 128 draft EIS which is scheduled for completion in January 1991. This information would also be beneficial in the preparation of all postlease environmental documents.

Current Status of Information on this Topic:

Few studies have been conducted on the effect of oil fouling on pinnipeds, especially pinniped pups. Much of the information available in the literature on the effects of oil on pinnipeds is anecdotal and subject to interpretation (Geraci and Smith, 1977). Geraci and Smith (1977) conducted a study similar to this proposal on several adult ring seals (Phoca hispida) and 6 harp seal (Phoca groenlandica) pups. They found that oiling of harp seal pups used in their experiment did not result in mortality and there were no thermoregulatory differences between the oiled and control pups. However, they concluded that the pups used in their experiment had already developed a blubber layer and that younger pups would probably be vulnerable to the thermal effects of oil contact.

Applicability of Information to Issues of Regional or Programmatic Concern:

The effects of oil spills on marine mammals is an important concern in regards to OCS activities in the Pacific Region. Since information is generally lacking on this subject, this study should clarify this issue with respect to harbor seals and potentially other pinniped species as well.

Regional Study No.: 30

Title: Ecology of Gray Whales Summering off Oregon and Northern California

Region: Pacific

Priority Ranking: A3B3

Proposed Period of Performance: FY 1990 - FY 1991 (2 years)

Cumulative Project Cost:

Applicable Planning Area: Northern California, Washington-Oregon

Key Words: gray whale

Description of Proposed Project

Objectives:

1) Determine the size of the resident gray whale (*Eschrichtius robustus*) population.

2) Through identifying characteristics, determine whether the population remains off northern California and Oregon throughout the year or whether some individuals only linger there during migration.

3) Determine the general movement patterns and range of this population and identify important concentration areas.

4) Describe the range behaviors displayed by this population (mating, calving, foraging, etc.) and whether these behaviors characteristically occur in certain areas.

Methods:

Through aerial and boat surveys the number and distribution of gray whales occurring off northern California and Oregon will be determined. Photographic records will be prepared for all individuals when possible, and these records would be used to determine whether the same individuals remain in the study area throughout the year. These records could also be used to describe general movement patterns of this population. Observed behavior will be delineated and the location of any preferred foraging and mating/calving areas will be determined.

Area of Study:

Northern California and Oregon

Products:

The major product from this study will be a final report and one peer reviewed journal article describing the results and implications of the research.

Justification

Importance of the Study to MMS Decisionmaking:

The gray whale is a federally listed endangered species and is one of the more numerous edangered species occurring in OCS waters offshore California, Oregon and Washington. Gray whales normally migrate from summer feeding areas offshore Alaska to coastal lagoons off Baja California each year. Although their annual migration brings gray whales into potential contact with OCS activities twice per year, this contact is limited to only a very short period of time. However, the individuals of a resident population, if such a population exists, would potentially be in contact with OCS activities throughout the year and impacts could involve the full range of gray whale behavior. The potential impacts of OCS activities on such a resident population would have to be addressed in more detail in MMS environmental documents than is probably necessary for strictly migratory gray whales.

Date Information is Required and Decisions Involved:

The information obtained through this study will assist MMS personnel in the preparation of future EISs and postlease environmental documents. However, since this is a two-year research project, the results of the study would not be available for either the EIS for Lease Sale 128 in northern California or Sale 132 in Oregon. The information should be available, though, for many of the postlease environmental assessments in these areas.

Current Status of Information on this Topic:

The occurrence of resident or "summering" gray whales has been established (Darling 1977, Dohl 1981). However, most of the research on these whales has been conducted in British Columbia (Darling 1977, 1978a, 1978b, 1979, 1984). Through periodic aerial surveys Dohl et al. (1981, 1983) observed that a small number of gray whales can be seen off the coast of central and northern California throughout the year including nonmigratory periods. However, Dohl et al. (1983) were unable to establish whether they were seeing the same or different individuals and the question of an actual resident population is still open to debate. Dohl et al. (1983) believed that the number "summering" whales was increasing, but estimates of the current population are unavailable.

Applicability of Information to Issues of Regional or Programmatic Concern:

The gray whale is an endangered species and MMS must pay particular attention to potential impacts of OCS development on this species. Resident gray whales could potentially be more vulnerable to OCS activities than migratory whales because a resident population would be exposed to the activities for a much longer period. In the preparation of environmental documents, a resident population would generally require a greater amount of information in an impact analysis than would a migratory population.

Regional Study No.: 31

Title: An Assessment of Heavy Metal and Hydrocarbon Input into the Southern California Planning Area by Age-Dated Box Cores

Region: Pacific

Priority Ranking: A3B3

Proposed Period of Performance: FY 1990 (1 Year)

Cumulative Project Cost:

Applicable Planning Area(s): Southern California

Key Words: sediment, contamination, age-dates, box core, heavy metals, hydrocarbons

Description of the Proposed Project

Objectives:

1) Determine the anthropogenic inputs of heavy metals and hydrocarbons in the last decade into the Southern California Planning Area through the use of the age-dated box core technique;

2) Compare the data to the historical record from the BLM baseline study and any other applicable work;

3) Determine the sources of these pollutants.

Methods:

The Soutar box core, developed for this purpose for the BLM baseline study conducted between 1976 and 1978, should probably still be used for this proposed study for comparative reasons. For similar reasons sampling sites and methods should be considered when developing the program for this proposal. Standard methodologies which would include AA of various types, GS/MS, etc. should be used for the laboratory analysis.

Area of Study:

Southern California offshore basins

Products:

Written report; inclusion in a peer-reviewed journal, briefing at MMS.

Justification

Importance of the Study to MMS Decisionmaking:

Since this study would "update" the input of anthropogenic pollutants (specifically, heavy metals and hydrocarbons) from the 1970s, correlations could be made between OCS oil and gas activities and the increase (or decrease) of these materials. Also, relationships could be detected between

Date Information is Required and Decision Involved:

The results from the first year of this study would be useful in preparing the necessary environmental documents for OCS production plans for areas offshore of Washington's sea otter range. The earliest this information would be used by MMS decisionmakers may be 1996.

Current Status of Information this Topic:

The MMS has recently spent over two million dollars in developing information on the sea otters vulnerability to oil, methods to clean and rehabilitate oiled sea otters, and over four years of population demographic information on the California and on a part of the Alaskan sea otter populations (Siniff and Ralls, 1988; Eberhardt, 1988; Hubbs Marine, 1986; Davis et al. 1988, and Costa and Kooyman, 1981). Most, if not all, of this information is directly applicable to the Washington sea otter population.

Applicability of Information to Issues of Regional or Programmatic Concern:

After the lease sale and exploratory activities, and when specific OCS development activities are planned for Washington the results of this study would provide useful information, enhancing the current information on this subject.

Regional Study No.: 32

Title: Evaluation of Potential Impact of Oil Spills on Neustonic Organisms and Their Predators.

Region: Pacific

Priority Ranking: A3B3

Proposed Period of Performance: FY 1990 - FY 1992 (3 Years)

Cumulative Project Cost:

Applicable Planning Area(s): Northern California

Key Words: crab, fish, neuston, oil spill, reproduction, seabirds

Description of Proposed Project

Objectives:

Determine if there are serious potential impacts of oil spills on commercially important fish during their life stages in the neuston (surface) layer. Verification of the hypothesis that these organisms are concentrated in convergence zones. Verification that seabirds are attracted to neuston concentrated in convergent zones.

Methods:

Neustonic larval and juvenile fishes and crabs will be sampled during 4 cruises along the central and northern California coast, with peak effort during the spring. We are proposing 3 years of survey effort, to evaluate interannual variability in distribution & abundance. Several types of nets will be used to assess broad scale distributions of organisms across the study area. Intensive sampling will examine fine-scale associations between fauna and oceanographic phenomena (e.g., convergences) that could concentrate both organisms and pollutants. We will also examine seabird distributions and their feeding habits on neustonic biota. The work will be coordinated with oceanographic studies in the area as much as possible.

Area of Study:

Between Fort Bragg, California and Pescadero, California, from nearshore to 100 kilometers off shore.

Products:

Annual and final reports, scientific papers and presentations.

Justification

Importance of the Study to MMS Decisionmaking:

The neuston is generally overlooked by those considering the potential damages of oil spills. It is however, of great importance, and its organisms vulnerable to oil on the water's surface. Early life history stages of three important commercial species. sablefish, English sole and Dungeness crab, appear to be obligate inhabitants of the neuston layer. Thus an oil spill could have an impact on reproductive success of commercially important species. Also young salmon and sea birds feed on neustonic organisms. Predators of neustonic organisms may be vulnerable to oil spills because of the concentrating effects of convergences.

Date Information Required and Decision Involved:

This is a general problem and results are pertinent to all lease sales.

Current Status of Information on this Topic:

Recent research suggests that the surface layer of the northeast Pacific supports a diverse and abundant assemblage of early life stages of commercially important fish and crab species. Some species (e.g. sablefish, Dungeness crab and English sole) have life stages that spend much, if not all, of their time at the surface. Other species (such as juvenile salmonids and seabirds) rely heavily on surface-dwelling organisms for food. However, little information is available about the broad temporal and spatial distributions of these neustonic organisms in the study area, which is potentially subject to oil spills. There is some evidence indicating that meso- and micro-scale oceanographic processes (e.g. development of frontal zones and convergences) aggregate these organisms. These processes can also aggregate oil and other pollutants, thus increasing the vulnerability of populations to oil spills.

Applicability of Information to Issues of Regional or Programmatic Concern:

The EIS for lease sale 91 does not identify the potential impact of oil spills on the neuston layer as significant and estimates that there is little potential for impact on fish. However, oil spills could have impacts on important species of fish and that the impact should be given consideration in plans.

Regional Study No.: 33

Title: Sediment Flux in the Santa Barbara Channel: Physical-Chemical Relationship to Drilling Muds Deposition and Fate

Region: Pacific

Priority Ranking: A3B3

Proposed Period of Performance: FY 1990 - FY 1992 (3 Years)

Cumulative Project Cost:

Applicable Planning Area(s): Southern California

Key Words: Santa Barbara Channel, sediment, sediment flux, drilling fluids, drilling muds, sediment deposition, fate and effects, contaminants

Description of the Proposed Project

Objectives:

1) Measure the rate (flux) of natural sediments that occurs in the Santa Barbara Channel.

2) Compare that rate with typical drilling fluid depositional rates, volumes and aerial coverages as predicted by the OOC Mud Model.

3) Determine, based on this comparison, the minimum amount of drilling fluid deposition that would be detectable against the natural background of sediment flux.

4) Include in both the natural sediment and drilling fluid effluent investigations, a chemical component which would analyze heavy metals, petroleum hydrocarbons and other non-petroleum organics in order to ascertain the contribution of these pollutants from each source.

5) Compare these chemical components and determine mass emissions from each source either from the literature or by field experimental means.

The hypothesis would be the following: Background levels of sedimentation (including the chemical components) are of a larger flux than that which is contributed by drilling fluids to the extent that drilling fluids would contribute no additional detectable impact to sediment sensitive benthic communities.

Methods:

For sediment fluxes--traps, GEOPROBE (ala Dave Cacchione of USGS); for drilling fluid analyses--old OOC model runs, mud logs from exploratory and development wells; for chemical investigations--standard methodologies which would include AA of various types, GS/MS, etc.

Area of Study:

Santa Barbara Channel

Products:

Written report; inclusion in a peer-reviewed journal, briefing at MMS.

Justification

Importance of the Study to MMS Decision Making:

The OOC Model is run for post-lease projects including both exploratory and development in order to determine the depositional fate of discharged drilling muds. The relationship between natural inputs of sediments (i.e., background levels) and drilling muds discharges is important because of the potential sensitivity of various biological communities to sedimentation. If, for any postlease project, sensitive communities are nearby and the above hypothesis can be shown to be true, then the decision to permit these projects would, in part, be made more simple by knowing this answer.

Date Information Required and Decision Involved:

The information is required as soon as it is available since it would be used for the first subsequent exploratory or development project that utilizes the OOC Model.

Current Status of Information on the Topic:

No comprehensive sampling of the sediment flux in the Channel has ever been conducted. However, Dave Cacchione has sampled with the GEOPROBE in other areas in southern California (possibly including the Channel) and is also involved in the CAMP effort.

Applicability of Information to Issues of Regional or Programmatic Concern:

The controversy that rages around the issue of drilling muds and their potential effect on sensitive benthic communities continues to be in evidence. A definitive study which answers some of the questions put forth in this prospectus would help to alleviate some of the public and scientific concern.

Regional Study No.: 34

Title: Washington-Oregon Seabird Monitoring Study

Region: Pacific

Priority Ranking: A3B3

Proposed Period of Performance: FY 1990 - FY 1999 (10 years)

Cumulative Project Cost:

Applicable Planning Area(s): Washington-Oregon

Key Words: seabirds, reproduction, monitoring

Description of Proposed Project

Objectives:

The objective of this study is to monitor the changes in seabird populations offshore Oregon and Washington to assess the impacts, if any, of oil and gas operations on these populations.

Methods:

1) Annual nesting surveys will document trends in population egg production and fledgling success for common murre and Leach's storm petrel.

2) Annual collections of bird tissues and eggs will be analyzed for levels of contamination.

Area of Study:

The Washington and Oregon coast.

Products:

Yearly reports on trends and findings.

Justification

Importance of the Study to MMS Decisionmaking:

Seabirds are among the top levels of the food chain in the ocean environment. As such key species may be used as good monitors for environmental quality. The reproductive success may be a particularly sensitive measure of impact from contaminant exposure in the food chain and by direct contact. It may also be a monitor for factors such as disturbance, decreasing food base, or other events which may cause indirect or chronic detrimental effects on the population.

Date Information Required and Decision Involved:

This study would be used to gather baseline data to which all other data may be compared. Therefore, the study should be started as soon as possible.

Current Status of Information on this Topic:

No long-term monitoring project has ever been developed to monitor impacts of oil and gas development on Washington-Oregon seabirds.

Applicability of Information to Issues of Regional or Programmatic Concern:

Migratory birds, including many species of seabirds, are a trust resource of the U.S. Fish and Wildlife Service. "Taking" of seabirds by accidental or intentional discharge of petroleum products or other contaminants is a violation of the Migratory Bird Treaty Act. This study should help to clarify the issue of the impact of oil and gas activities on seabird populations.

Regional Study No.: 35

Title: Least Tern Colony Occupation and Disturbance Inventory

Region: Pacific

Priority Ranking: A4B3

Proposed Period of Performance: FY 1990 (1 Year)

Cumulative Project Cost:

Applicable Planning Areas: Southern and Central California

Key Words: seabirds, nesting areas, nesting colonies, field surveys, disturbance, harassment

Description of the Proposed Project

Objectives:

This study will observe periodically the nesting and roosting habitats of mainland least tern colonies and document the amount of disturbance to which they are typically subjected.

Methods:

Terns will be observed from blinds at several mainland colonies in California. Sites will be selected from locations that are typical of areas of both low and high disturbance. The study will attempt to test the following null hypothesis: least terns in areas of high and low human disturbance do not exhibit significantly different nesting behavior, hatching success, fledging success, or roosting behavior. This study will be conducted within one year.

Area of Study:

Coastal California

Products:

A report on the nesting and roosting behavior of least terns as related to various levels of direct or indirect human disturbances.

Justification

Importance of the Study to MMS decisionmaking:

Results from this study will be used in all future pre- and postlease environmental impact assessments for the southern and central California OCS, including EAs, EISs and SIDs and in all future Biological Assessments concerning these species.

Date Information is Required and Decision Involved:

Updated information should be available for the Draft EIS for Lease Sale # 128, Southern California, scheduled to be released May, 1991.

Current Status of Information on this Topic:

The ability of these birds to nest near frequently used railroads (Davis 1968) and fenced enclosures on public beaches (Massey 1972) suggest they can withstand much disturbance. However, no specific study exists documenting the nesting and roosting behavior and/or habituation of these birds to direct or indirect human disturbance.

Applicability of Information to Issues of Regional or Programmatic Concern:

A better understanding of how terns cope with existing disturbances should allow for the development of more effective and appropriate mitigation measures, should they be needed.

Regional Study No.: 36

Title: Feeding Ecology of Steller Seal Lion

Region: Pacific Priority Ranking: A4B3

Proposed Period of Performance: FY 1990 - FY 1991 (2 years)

Cumulative Project Cost:

Applicable Planning Areas: All Pacific and Alaska OCS Planning Areas south of the Bering Strait

Key Words: Steller sea lion, northern sea lion, marine mammal, pinnipeds, animal behavior, ecology, diet

Description of the Proposed Project

Objectives:

The objectives of this study are to identify Oregon's Steller sea lion, Eumetopias jubatus, female feeding areas and range and diet.

Methods:

This two season field investigation will met the objectives of this study by marking lactating females and determining their feeding areas. The distance and time travelled by the lactating females, the identification and characteristics of the area they visited , the persistence of their feeding location(s) over a two year period, and their diet will be observed. From an analysis of this information the significance of the feeding areas and their relationship to potential Oregon offshore oil and gas development activities to the health and growth of the Oregon Steller sea lion individuals and population will be examined. The final report would be expected 24 months after contract award.

Area of Study:

Coastal Oregon

Products:

The major product from this study will be a final report and at least one peer-reviewed journal article.

Justification

Importance of the Study to MMS Decisionmaking:

The Steller sea lion is a species in decline throughout its range except for the Oregon breeding population (Brown, 1988). No reason(s) for the entire population's general decline and the stability of Oregon's population is known. The National Marine Fisheries Service (NMFS) intends to publish a proposed rule, designating the Alaska population as depleted under the Marine

Mammal Protection Act (Federal Register 1988). In 1987 NMFS reported that the Steller sea lion has declined over 50% over the last 30 years from a population of 140,000 to about 68,000.

Steller sea lions, throughout their range, give birth from mid-May to mid-July. Pups remain with their mothers for most of their first year. The time of weaning is variable in different parts of the range. Most pups are weaned prior to their first birthday. Survival of the young is of course important to the stability and survival of this or any animal population. Prior to weaning any disruption in the care of the young may result in the Oregon population being impacted.

This study would identify Steller sea lion feeding areas in Oregon to help assess potential effects of OCS development activities on this species' only remaining stable population.

Date Information is Required and Decision Involved:

Information from this study would be used in post-award decisions that may have to be made as early as October 1992, such as permits for exploratory drilling activities. A contract award made in early FY 1991, would provide enough time to conduct the study and have preliminary information for future Oregon coast OCS exploratory drilling permits and associated environmental impact reports.

Current Status of Information this Topic:

A majority of the Steller sea lion studies have been conducted in Alaska (Hoover, 1988). Works by Bonnell (1978), Gentry (1970), and Mate (1973) have significantly increased the our understanding of this species California and Oregon populations. Hoover, in her 1988 summary of this species, lists nine studies that examined the Steller's diet. No work has been conducted on identifying the Oregon population feeding areas.

Applicability of Information to Issues of Regional or Programmatic Concern:

The Steller sea lion may soon be listed as a depleted species. Because of the tenuous status of this species on a worldwide basis MMS should be confident that its OCS activities will not disrupt the stable Oregon population.

Regional Study No.: 37

Title: Effect of Petroleum Operations on Metal Metabolism of Marine Organisms Exposed in Situ

Region: Pacific　　Priority Ranking: A4B3

Proposed Period of Performance: FY 1990 - FY 1992 (3 years)

Cumulative Project Cost:

Applicable Planning Area(s): All Planning Areas, All Regions

Key Words: petroleum operations, impacts, marine organisms, metal metabolism

Description of Proposed Project

Objectives:

To determine impacts of petroleum operations in the OCS on the health of benthic marine species. The method suggested may provide approximately quantitative data on how benthic animals handle potentially toxic materials and their impact on the health of the animals.

Methods:

Local benthic animals would be collected in proximity to drilling or operational areas. Tissues would be homogenized, extracted with appropriate solvents and separated into protein fractions which would be subjected to separation into molecular weight groups through chromatography. The characterization of metal components in the several molecular-weight groups is an indication of how the animals have handled toxic components.

Area of Study:

Offshore southern and central California.

Products:

Reports that include descriptions of methods, procedures and protocols for impact analysis.

Justification

Importance of the Study to MMS Decisionmaking:

The question continually arises concerning health impacts of proposed leasing and petroleum operations. These new methods, already tested in a California marine project, may be able to clarify, for the federal OCS areas, whether and how serious are impacts from petroleum operations.

Date Information Required and Decision Involved:

Information could be used as soon as obtained to determine impact possibilities in future OCS lease sales.

Current Status of Information on this Topic:

Several recent publications are relevant, including:

Jenkins, K.D., D.A. Brown, P. Oshida and E.M. Perkins. 1982. Cytosolic metal distribution as an indicator of toxicity in sea urchins from the southern California bight. Marine Pollution Bulletin 13(12): 413-421.

Jenkins, K.D. and B.M. Sanders. 1986. Assessing biological effects of contaminants in situ. Proceedings of a Conference on Urban Runoff Quality. American Society of Chemical Engineers. New Hampshire, 23-26 June 1986.

Jenkins, K.D., S. Howe, B.M. Sanders and C. Norwood. 1988. Effects of drilling fluids on metal metabolism of marine organisms exposed in situ. Project conducted for California Regional Water Quality Board and Shell Oil Company, California State University, Long Beach.

Applicability of Information to Issues of Regional or Programmatic Concern:

Methods and resultant data would provide information on actual health impacts to local benthic biota. It may be possible, with knowledge also of ocean currents, temperatures, etc., to estimate regions of varied impacts, both lesser or greater.

Regional Study No.: 38

Title: Fur Seal Cleaning Study

Region: Pacific

Priority Ranking: A4B3

Proposed Period of Performance: FY 1990 (1 year)

Cumulative Project Cost:

Applicable Planning Areas: All Pacific Planning Areas

Key Words: Northern fur seal, crude oil, OCS, oil spill, animal cleaning and husbandry

Description of the Proposed Project

Objectives:

Rehabilitation of oiled fur seals.

Methods:

The investigator shall develop oiled fur seal capture, cleaning, rehabilitation, and release techniques and procedures in a method similar to those developed for the sea otter (Hubbs Marine, 1986). The San Miguel Island fur seal herds have a propensity to stampede at the sight of man or other disturbances (Bonnell et al., 1978). Because of this apparent limitation, the intent of this study is to develop the above techniques for the individuals isolated from the main population.

Area of Study:

A laboratory experiment is anticipated.

Products:

The final report will be an "Oiled-Fur Seal Cleaning and Care Manual."

Justification

Importance of the Study to MMS Decisionmaking:

Fur seals have been identified in MMS EISs as being very vulnerable to spilled oil. They are the only pinniped without a significant blubber layer and rely on their dense fur for insulation. The results of this study would be used by personnel from the National Marine Fisheries Service and the California Department of Fish and Game in caring for fur seals accidently oiled.

Date Information is Required and Decision Involved:

Information gained form this study would be used by oil companies in their preparation of oil spill contingency manuals. This information would also be useful in MMS prepared pre- and post lease environmental documents, which include descriptions of the available mitigations measures that could be used in the event of an OCS accidental oil spill striking fur seals.

Current Status of Information this Topic:

Information is available on fur seal drug immobilization. The Hubbs report (1986) contains information that may be applicable to fur seals.

Applicability of Information to Issues of Regional or Programmatic Concern:

Providing mitigations for possible OCS adverse impacts is a goal of the study Program. Results from this study would be applicable to all Pacific coast OCS planning areas south of the Bering Sea.

Regional Study No.: 39

Title: Washington Sea Otter Population Study

Region: Pacific

Priority Ranking: A4B3

Proposed Period of Performance: FY 1990 (1 Year)

Cumulative Project Cost:

Applicable Planning Areas: Washington-Oregon

Key Words: sea otters, marine mammals, population dynamics

Description of the Proposed Project

Objectives:

The objectives are to obtain site specific information on the Washington sea otter population growth rate and movement patterns so that more accurate population recovery rates may be developed.

Methods:

A portion of the population would be radio-tagged and monitored for a 1-3 year period. The methods would be similar to those used by Siniff (1988). If the analysis of the first years effort yields a significant difference between the Washington population data and data from population studies conducted in Alaska and California the study would be continued for the three field seasons.

Area of Study:

Coastal Washington

Products:

The major product from this study will be a final report and one peer-reviewed journal article.

Justification

Importance of the Study to MMS Decisionmaking:

Upon contact with oil the sea otter is the marine mammal most likely to die. The sea otter has no blubber and depends upon its thick fur to insulate itself from the cold (Costa and Kooyman, 1973). The Washington population, estimated to be about 100 animals is a result of 59 Alaskan sea otters being introduced to Washington between 1969 and 1970 (Jameson, et al, 1982).

Date Information is Required and Decision Involved:

The results from the first year of this study would be useful in preparing the necessary environmental documents for OCS production plans for areas offshore of Washington's sea otter range. The earliest this information would be used by MMS decisionmakers may be 1996.

Current Status of Information this Topic:

The MMS has recently spent over two million dollars in developing information on the sea otters vulnerability to oil, methods to clean and rehabilitate oiled sea otters, and over four years of population demographic information on the California and on a part of the Alaskan sea otter populations (Siniff and Ralls, 1988; Eberhardt, 1988; Hubbs Marine, 1986; Davis et al. 1988, and Costa and Kooyman, 1981). Most, if not all, of this information is directly applicable to the Washington sea otter population.

Applicability of Information to Issues of Regional or Programmatic Concern:

After the lease sale and exploratory activities, and when specific OCS development activities are planned for Washington the results of this study would provide useful information, enhancing the current information on this subject.

Regional Study No.: 40

Title: Effects of Geophysical Survey Acoustic Signals on the Spawning of Rockfish

Region: Pacific Priority Ranking: A4B3

Proposed Period of Performance: FY 1990 - FY 1991 (2 Years)

Cumulative Project Cost:

Applicable Planning Areas: All Pacific OCS Planning Areas

Key Words: rockfish, acoustic effects, rockfish larvae, Sebastes, sound effects, geophysical surveys, startle response, mortality rates, fish behavior

Description of Proposed Project

Objectives:

1) Determine the effects of geophysical survey acoustic signals on premature release of rockfish larvae.

2) Determine effects of premature release of larvae on rockfish mortality rates.

Methods:

Study would use gravid female rockfish species of commercial importance which live in the mid to upper water column and whose reproductive life histories have been studied. The study design would include use of acoustic devices that mimic or closely relate to actual geophysical survey acoustic devices. A panel of acoustic and rockfish experts should be consulted or convened to determine which species to study and whether the experiment should take place in the laboratory or the field.

Area of Study:

Pacific OCS Region. The location of a field study would be determined by the location of the test species.

Products:

A report describing the results of the study.

Justification

Importance of the Study to MMS Decisionmaking:

MMS has given high priority to studying the effects of geophysical surveys on commercial fish species, namely rockfish. The first study, conducted by Battelle/Marine Research Laboratory and titled "Effects of Sounds from a Geophysical Survey Device on Fishing Success", indicated that several species of rockfish gave alarm and startle responses from sounds from an airgun but returned to normal behavior quite quickly. The study also concluded that catchability of the fish was significantly reduced.

This proposed 1990 ESP study proposal would further describe potential effects of geophysical survey activities on rockfish. It would follow-up on the Battelle study by determining what, if any, effect the startle response has on the premature release of rockfish larvae. This information would enable regulators to make informed decisions regarding warranted changes in or mitigation measures for the geophysical survey program and permits.

Date Information Required and Decision Involved:

Information from this study is needed as soon as possible to address postlease geophysical surveys in northern and central California and prelease surveys in central California, Oregon, and Washington. This information may also be useful for addressing survey programs and permits in other regions.

Current Status of Information:

Very little, if any information exists on this topic. However, information related to this topic is being developed in studies sponsored by MMS and other entities. See following response.

Applicability of Information to Issues of Regional or Programmatic Concern:

In addition to the MMS sponsored geophysical survey/commercial fish studies, the Eggs and Larvae Committee, with MMS participation and funding, is also studying the effects of surveys on commercial fish and shellfish. The proposed rockfish larvae study would add to the information developed through the study done by Tracor Applied Sciences for the American Petroleum Institute and the Committee "The Effects of Airgun Energy Releases on the Eggs, Larvae and Adults of the Northern Anchovy". This study indicated that exposure of larvae to airguns resulted in some reduced survival. The Committee recommended that additional work be done to assess affects of seismic airguns on anchovy or other commercial fish species and is currently conducting another study that is investigating the effects of acoustic signals on Dungeness crab larvae.

MMS recognizes the importance of west coast fisheries, in general, by assigning high priorities to two other studies in the FY 1989 ESP. They are "Washington, Oregon, and California OCS Fisheries Resource Data Base" and "An Evaluation of Spawning and Recruitment Patterns of Washington, Oregon, and Northern California Fishes." Both studies could aid in determining the test species and location of a field experiment for the proposed 1990 study.

A high priority ranking of the proposed study would continue MMS's commitment to studying the effects of offshore oil and gas operations on commercially important fish and would explain the effects of behavioral changes observed in the Battelle study.

Regional Study No.: 41

Title: Monitoring Biological Impacts of Oil and Thermal Discharge in Pacific Coastal Waters

Region: Pacific

Priority Ranking: A4B3

Proposed Period of Performance: FY 1990 - FY 1992 (3 years)

Cumulative Project Cost:

Applicable Planning Area(s): All Pacific Planning Areas

Key Words: biological impacts, satellite imagery, phytoplankton, oil spill models, cumulative effects

Description of Proposed Project

Objectives:

The project seeks to 1) develop cost-effective means to monitor the impact of pollutant discharges on a key biological resource at the base of the marine food web-phytoplankton density; 2) establish baseline information on patterns of variance in phytoplankton distribution along particular sections of the California coastal waters as a basis for discriminating anthropogenic influences from background patterns; 3) determine the utility of using satellite imagery to measure cumulative biological impacts of various pollutant discharges (heat, oil, other) on phytoplankton and 4) determine the utility of satellite imagery for tracking the movement of large oil spills over a several day period, for use in validating oil spill trajectory models used in oil spill containment and cleanup operations.

Methods:

The technical approach will involve the use of satellite imagery data: Coastal Zone Color Scanner (CZCS) and LANDSAT Thematic Mapper (TM). To monitor the impacts of oil spills and thermal discharges on biological resources, we will compare the appropriate satellite images to a data base of "Pollutant Incidents in and around U.S. Waters," maintained by the U.S. Coast Guard, and to phytoplankton densities (measured as chlorophyll and its breakdown products) measured near the San Onofre nuclear generating station near San Clemente, California. Baseline patterns of phytoplankton abundance will be analyzed using pattern analysis techniques on CZCS imagery. In addition, parameters of community resilience (inertia, amplitude) will be measured using the CZCS data on phytoplankton response to oil spills. Also, two oil spill trajectory models will be validated using oil spill dispersion patterns observed by CZCS data.

Area of Study:

Pacific coastal waters.

Products:

The utility of CZCS and/or LANDSAT TM data in monitoring impacts of oil spills and thermal discharges will be communicated to potential user communities in the following ways: papers in the refereed literature, illustrated seminars on findings to MMS and to the petroleum industry forums, as well as to the remote sensing community.

Justification

Importance of the Study to MMS Decisionmaking:

Maintaining the health of coastal marine biological resources is an objective of many organizations in the public and private sectors including the MMS. In order to satisfy the public's concern about the environmental impacts of oil exploration and development, there is need for more cost-effective means to detect and monitor the biological effects of oil spills and other pollutant discharges on marine life.

At least two oil spill trajectory models are currently available for use in predicting direction and rate of spread of oil slicks. Satellite tracking of past oil spills, combined with a knowledge of driving variable data at the time, could be used to further validate one or both models, and to learn more about the strengths and weaknesses of the models.

Date Information Required and Decision Involved:

The results from this study can be incorporated into Environmental Impact Statements (EIS) for upcoming lease sales along the Pacific Coast. They will also be useful for the public hearing process related to lease sales, the five-year plan on offshore oil exploration and development, and other environmentally-related hearings.

Current Status of Information on this Topic:

In the case of phytoplankton monitoring, the high spatial variability in phytoplankton density requires very intensive sampling over space and time to characterize patterns and changes. The collection and analysis of such data are time-consuming and expensive. Satellite imagery offers the opportunity not only to reduce costs of sampling, but to provide a much more synoptic image of phytoplankton distribution; such imagery could potentially be used to interpolate phytoplankton patterns between sea-level sampling dates.

The CZCS data, which cover the period of September 1979 to June 1986, are available from the NASA Jet Propulsion Laboratory. These data (some 10,000 images of a 5 x 5 degree grid off the California coast) have already been atmospherically corrected and converted to chlorophyll densities. The satellite containing the CZCS sensor had an average return time of 5-6 days, so that including side angle views, any area of the near Pacific coast is potentially visible 3 out of every 5 days.

Applicability of Information to Issues of Regional or Programmatic Concern:

The research project has several applications to issues of regional and programmatic concern. First, the demonstration of the utility of the CZCS and/or LANDSAT TM images in monitoring environmental impacts in coastal waters will open the way for the establishment of ongoing monitoring programs by the public sector, and for project-specific use of the satellite technology by environmental consultants, government, and industry research staffs in environmental monitoring. Second, the ability to characterize the stable and random components of the phytoplankton pattern will be of considerable interest to all agencies charged with monitoring biological impacts in the nearshore environment. Third, accurate predictions of oil spill movement are needed in real time by agencies and oil companies charged with oil spill containment and cleanup.

Regional Study No.: 42

Title: Assessment of Background Seawater Chemical Compositions for the Santa Barbara Channel

Region: Pacific   Priority Ranking: A4B3

Proposed Period of Performance: FY 1990 - FY 1991 (2 years)

Cumulative Project Cost:

Applicable Planning Area(s): Southern California

Key Words: background, water column, chemical composition, toxicity

Description of Proposed Project

Objectives:

To develop an accurate assessment of water column chemistry, with special focus on EPA criteria pollutants, for specific planning area. Seasonal validation will be assessed for 1 1/2 years to allow permitting agencies, particularly MMS and EPA to assess potential impacts from specific projects and from potential lease sales.

Methods:

Water column samples at various depths of various stations throughout various months, with parts per million concentrations determined for a wide range of criteria pollutants - mostly heavy metals and organics.

Area of Study:

Santa Barbara Channel and Santa Maria Basin

Products:

Report

Justification

Importance of the Study to MMS Decisionmaking:

Due to recent studies indicating sublethal effects to marine organisms by substances in platform discharges, better background information is necessary upon which to base NPDES permits.

Date Information Required and Decision Involved:

The information would be used for postlease environmental planning documents that relate to the Santa Barbara Channel

Current Status of Information on this Topic:

Information exists from a variety of nearshore sources.

Applicability of Information to Issues of Regional or Programmatic Concern:

This information is relevant to both project specific and regional (cumulative) development. In addition, the information is essential to EPA as the basis for their proposed general permit (NPDES).

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Appendix A. Criteria for Ranking Studies in the FY 1990 Regional Studies Plan

Criterion A -- Mandate for Conducting the Study

1. Study information is essential for a specific leasing, lease management, or program management decision because study is:

   a. Ordered by a court to support a sale or program-specific decision; or

   b. Explicitly required by existing Federal or State statute, or by Agency Directive.

2. Study would provide critical information for a specific leasing or lease management decision involving environmental risk or impact or for a specific program management decision; or a similar study is required by previous agreement for settlement of litigation in a similar OCS region.

3. Study would provide useful information for a specific leasing or lease management decision involving environmental risk or impacts or for a specific program management decision.

4. Study information would not affect a specific leasing or lease management decision involving environmental risk or impact or a specific program management decision. However, it could contribute to improved leasing, lease management, or program management decisions through enhancement and/or refinement of the quality of the database.

Criterion B -- Timing and Content for Information

1. Study must be initiated in the budget period at issue:

   a. In order to be completed in time for use in a specific leasing, lease management, or program management decision;

   b. Because study is a necessary prerequisite for another study to support a leasing, lease management, or program management decision; or

   c. Because study is a continuation or logical subsequent to an ongoing study to suport a leasing, lease management, or program management decision.

2. Study can be deferred until the next budget period. However, such deferral creates significant risk that study cannot be completed in time for use in immediate leasing, lease management, or program management decision.

3. Study can be deferred until the next budget period and still be completed in time for use in forthcoming leasing, lease management, or program management decisions.

Appendix B. Glossary of Acronyms

BLM - Bureau of Land Management
CEIP - Coastal Energy Impact Plan
DES/DEIS - Draft Environmental Statement/Draft EIS
DOI - Department of the Interior
EA - Environmental Assessment
EDIS - Environmental Data and Information Service
ES/EIS - Environmental Statement/Environmental Impact Statement
ESP - Environmental Studies Program
FES - Final Environmental Statement/Final EIS
FY - Fiscal Year
FWS - Fish and Wildlife Service
ITM - Information Transfer Meeting
IPP - Intergovernmental Planning Program for OCS Oil and Gas Leasing, Transportation and Related Facilities
MOU - Memorandum of Understanding
MMS - Minerals Management Service
NAS - National Acadamy of Science
NDBC - National Data Bouy Center
NEPA - National Environmental Policy Act of 1969
NMFS - National Marine Fisheries Service
NOAA - National Oceanic and Atmospheric Administration
NTIS - National Technical Information Service
OCD - Offshore and Coastal Dispersion (model)
OCS - Outer Continental Shelf
OCSLAA - Outer Continental Shelf Lands Act Amendments
PARIS - Plume-Airshed Reactive-Interacting System (model)
RFP - Request for Proposal
RSP - Regional Study Plan
RTMP - Regional Transportation Management Plan
RTWG - Regional Technical Working Group
SCCCAMP - South Central Coast Cooperative Aerometric Monitoring Program
SID - Secretarial Issue Document
TA&R - Technology Assessment and Research Branch
USCG - United States Coast Guard
USGS - United States Geological Survey

Appencix C. List of Regional Depository Libraries

California

Humboldt State University
Library
Arcata, California 95521

California State Lands Commission
Attn: Research & Planning Division
1807 13th Street
Sacramento, California 95814

California Polytechnic State
University
Library
San Luis Obispo, California 93407

University of California
General Library
Government Documents
Berkeley, California 94720

Environmental Protection Agency
Region IX Library
215 Fremont Street
San Francisco, California 94150

Association of Monterey Bay Area
Governments
977-A Pacific Street
Monterey, California 93940

Santa Barbara Museum of Natural
History
Library
2559 Puesta del Sol
Santa Barbara, California 93105

University of California
McHenry Library
Government Publications
Santa Cruz, California 95064

Scripps Institute of Oceanography
Library
Reference Librarian USDC-075C
La Jolla, California 92093

University of California
Public Affairs Service/URS. Docts.
U.C.L.A. Research Library
405 Hilgard Avenue
Los Angeles, California 90024

California (cont'd)

Santa Barbara Public Library
1021 Anacapa Street
Santa Barbara, California 93102

College of the Redwoods
Mendocino Coast Education Center
1211 Del Mar Drive
Fort Bragg, California 95437

California Coastal Commission
631 Howard Street, 4th Floor
San Francisco, California 94105

Oregon

Multnomah County Library
Technical Services
801 SW Tenth Avenue
Portland, Oregon 97205

Oregon State University
Kerr Library
Corvallis, Oregon 97331

University of Oregon
Institute of Marine Biology
Charleston, Oregon 97420

University of Oregon
Main Science Library
Eugene, Oregon 97403

Portland State University
Business Document Library
934 S. Harrison
Portland, Oregon 97201

Hatfield Marine Sciences Center
Library
Newport, Oregon 97365

Oregon State Library
Salem, Oregon 97310

Clatsop Community College
1688 Lexington
Astoria, Oregon 97103

Washington

Grays Harbor College Library
Aberdeen, Washington 98520

Peninsula College Library
1502 East Lauridsen Blvd.
Port Angeles, Washington 98362

University of Washington
Fisheries-Oceanography Library WB30
151 Oceanography Teaching Build.
Seattle, Washington 98195

Western Washington University
Wilson Library
Bellingham, Washington 98225

Evergreen State College
Library Serials L 2300
Olympia, Washington 98505

Washington State Library
State Library Building AJ-11
Olympia, Washington 98504

NOAA Library E/AI216, Building 3
7600 Sand Point Way NE
Seattle, Washington 98115-0070

Olympic National Park
Document Repository
600 East Park Avenue
Port Angeles, Washington 98362

Environmental Protection Agency
Library, MD-108
1200 6th Avenue
Seattle, Washington 98101

Seattle Public Library
Documents Unit
1000 Fourth Avenue
Seattle, Washington 98104

The following government agencies will receive copies of final reports relevant to their expertise:

U.S. National Park Service
Channel Islands National Park
1901 Spinnaker Drive
Ventura, California 93001

U.S. National Marine Fisheries
Service
Southwest Region
300 South Ferry Street
Terminal Island, California 90731

U.S. National Marine Fisheries
Service
Southwest Fisheries Center
Library
P.O. Box 217
La Jolla, California 92038

California Department of Fish
and Game
245 West Broadway
Long Beach, California 90802

California State Lands Commission
245 West Broadway, Suite 425
Long Beach, California 90802

U.S. Geological Survey
Library
345 Middlefield Road
Menlo Park, California 94025

U.S. Fish and Wildlife Service
500 N.E. Multnomah Street, Room 1692
Portland, Oregon 97232

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interest of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. Administration.

March 3, 1849

U.S. DEPARTMENT OF THE INTERIOR · MINERALS MANAGEMENT SERVICE ·